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CHARLES T. JACKSON

[1805-1880]

[From Hieronymus Mercurialis: Praelectiones Patavinae. Venetiis, 1603.]

ANNALS OF MEDICAL HISTORY

NEW SERIES, VOLUME VI MARCH, 1934 NUMBER 2

THE PROGRESS AND PIONEERS OF PREVENTIVE MEDICINE*

By SIR HUMPHRY ROLLESTON, BART., G.C.V.O., K.C.B., M.D.

HASLEMERE, SURREY, ENGLAND

IN his great speech at Manchester on April 3, 1872, Disraeli† stated that:

> A great scholar and a great wit, 300 years ago, said that, in his opinion, there was a great mistake in the Vulgate, which as you all know is the Latin translation of the Holy Scriptures, and that instead of saying "Vanity of vanities, all is vanity"—*Vanitas vanitatum, omnia vanitas,* the wise and witty king really said, *Sanitas sanitatum, omnia sanitas.* Gentlemen, it is impossible to overrate the importance of the subject. After all, the first consideration of a Minister should be the health of the people.

This famous paraphrase prophetically represented the present ideal of medicine, namely the prevention of disease, the object of which George Newman thus defined: "to improve environment, to avoid disharmony in its early stages, in order to escape its later results in the body, and to prolong and enlarge man's days."

The activities and applications of preventive medicine must depend on the view taken as to the causes and nature of disease. Disease is a disharmony of the body resulting in its abnormal reaction to influences or stimuli which may be (1) extrinsic and environmental factors acting from outside, such as bacteria, protozoa, or physical agents. Here comes in the saving grace of hygiene or sanitary science; or (2) intrinsic such as deficient resistance or exaggerated sensitiveness to environmental agents which do not disturb the average individual. This susceptible condition may be inborn, and here eugenics may in the future play an important prophylactic part; it may on the other hand be induced by external factors, and this acquired liability may, it would seem, eventually be transmitted as an inborn trait. It is therefore clear that disease may be brought about in a number of ways, and that measures for its prevention to be adequate must therefore be correspondingly wide.

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† Disraeli then repeated what he had previously said at Aylesbury on September 21, 1864, when it did not attract much attention. In reply to an inquiry Mr. G. E. Buckle, author of the part of the "Life of Benjamin Disraeli" from which this quotation is taken, wrote rather enigmatically: "I failed to trace 'the great scholar and great wit;' I fear this is one of the minor mysteries of a man who was himself emphatically a mystery."

* A lecture given under the Chadwick Trust and the Association France-Grande-Bretagne on April 8, 1932, in the house of the Académie de Médecine, Paris, with the President, M. Meillère, in the chair.

Like Medicine, the mother-subject with its branch of curative activity, preventive medicine has its own divisions. Preventive, even more than curative, medicine necessarily depends on an accurate knowledge of the causes of disease, and historically the development of preventive medicine has followed that of Medicine, from the era of the primitive ideas that disease was supernatural and due to the action of enraged deities or evil spirits, through the period of the miasma or hypothesis of bad air, as suggested in the title of the Hippocratic treatise "Airs, Waters and Places," to the present view that the influence (i) of bacterial and other extrinsic factors, and also (ii) of heredity and constitutional states all play their respective parts. Epidemiology, a thoroughly practical basis of considerable standing, has recently been elaborated by the experimental method by Simon Flexner of the Rockefeller Institute for Medical Research, New York, and by W. W. C. Topley and G. S. Wilson first at Manchester and then at the London School of Hygiene and Tropical Medicine, with the help of the expert medical statistician Major Greenwood.

The foundations of vital statistics were laid by John Graunt (1620–1674), William Petty (1623–1687), and Edmund Halley (1656–1742) the astronomer. In the last century William Farr (1807–1883), a medical man and self-taught mathematician, was well described by W. H. Welch as having "made literature out of statistics." Appointed in 1838, on Chadwick's recommendation, compiler of abstracts in the office of the Registrar-General, he applied statistical methods to epidemiology, and was the first to give mathematical expression to the rise and fall of epidemic diseases. This made possible the accurate determination of the occurrence of epidemics, for example "influenza" and measles (J. Brownlee) so that due preparation for them can be arranged. But the failure so far to abolish the recurrence of influenza shows how far preventive medicine is from finality, and influenza unfortunately now antagonizes the improvement in infantile mortality.

Bacteriology, due to the genius and industry of Louis Pasteur (1822–1895) admirably seconded by Robert Koch (1843–1910), and protozoology, which owes much to Timothy Lewis (1841–1886), A. Laveran (1845–1922), Patrick Manson (1844–1922), W. B. Leishman (1865–1926) and many others, have altered the scope of preventive medicine by revealing the causes of infectious diseases and so providing a scientific basis for their prevention. Previously public health was working in the dark, but bacteriology and mycology have initiated advances, the ultimate results of which are as yet out of sight.

Physiology is the basis of medicine, and its modern application to the prevention of disease has greatly advanced lately, especially from the work of J. S. Haldane and Leonard Hill, and by the value of preventive physiological tests, as shown by Martin Flack's tests to determine whether or not air-pilots are fit to fly. Applied psychology, for example by mental hygiene, to prevent insanity is another example of the assistance preventive medicine may receive from the sciences.

Sanitary science concerned with the knowledge of the spread of infections and the methods of prevention, such as a good and pure water supply, proper drainage, notification and isolation, is thus an important part of its practice. Public Health is not exactly synonymous with preventive medicine, of which it is a part; it is a means of attaining that end and applies particularly to the community as a whole.

As about 80 per cent of the population are born healthy it is important to protect them in their state of helplessness from the dangers of infection, improper feeding, and neglect. Preventive medicine has now secured the help of the State in preserving the health of infants and children by Infant Welfare Clinics and the School Medical Service established in England and Wales in 1907, and of expectant mothers by the institution of antenatal clinics. By special clinics for tuberculosis and venereal disease the spread of these affections is limited. Campaigns against *tuberculosis, venereal disease, cancer, rheumatism, and mental disorders,* have been vigorously undertaken in various countries by organizations other than those of the Governments.

Education of the public in what were called "the laws of physiological righteousness" by Andrew Clark (1826–1893) is an essential part of preventive medicine. In Great Britain simple hygiene is taught and practised in all the State schools; health weeks, classes, and literature are provided by voluntary health societies, and the public press has taken part in propaganda.

The prevention of disease is closely bound up with the sociological problem of poverty and of the resulting conditions detrimental to good health. Poverty, described by John Simon as "the worst sanitary evil," is a gigantic problem, the prevention and relief of which depend mainly on the activity of the State.

HISTORY OF PREVENTIVE MEDICINE

In the light of present knowledge there is some risk of ascribing to the actions and words of the ancients a prophetic germ or more advanced anticipation than is really justified of later developments. In this respect it is difficult to steer an accurate course between the Scylla of exaggerating and the Charybdis of neglecting the achievements of the Fathers of Medicine. Osler philosophically considered the difficulties of reaching a right conception of this problem: "To understand the old writers one must see as they saw, feel as they felt, believe as they believed—and this is hard, indeed impossible."

It may be assumed with fair probability that some degree of health-protective measures has existed from the earliest times, as an essential for the survival in the struggle for existence. Sewer pipes of the Manoan civilization in Greece, made of terra cotta, have been found in the Cretan Palaces at Knossus (B.C. 3500) and Tiryns (B.C. 1450–1250). At Assur, the oldest city of Assyria, and at Babylon drainage systems were of a high standard. Ancient Egypt was early in elaborating sanitary precautions; Moses was "learned in all the wisdom of the Egyptians," and the Book of Leviticus, dating from about the sixth century before Christ, gives most definite directions for the prevention of disease. The ancient Hebrews have been described as the founders of prophylaxis and their high priests as "true medical police" (Garrison). It appears that in the fifth century before Christ hygiene and sanitation were well advanced in China. In Greece hygiene, especially with reference to the education of children, was not neglected. Walter Pater argued that the Asclepiadae or priest-physicians presiding over the Asclepia or temples of health, erected in honor of Asclepius (Aesculapius) from B.C. 600, were imbued with the germ of preventive medicine; and in the words of that remarkable man, Francis Adams (1796–1861) of Banchory, the Hippocratic treatise on "Airs, Waters and Places" contains the oldest extant exposition on many important questions connected with public hygiene and political economy. Erasistratus (B.C. 310–245) of Chios, the rival of Herophilus as leader of the School of Alexandria, wrote a book on hygiene. In ancient Rome the fourteen aqueducts, the enactments for the prevention of water pollution, the *cloaca maxima* and other sewers were of great hygienic value, and wherever the Romans went irrigation and water supplies were left as evidence of their wisdom. The medical men in Rome, however, did not specialize in the subject; among Galen's numerous works is a large treatise on hygiene, but it is chiefly a physician's advice to his individual patients.

The decline and fall of Rome have been ascribed to several factors, such as failure of the gold and silver mines in Spain and Greece causing a shortage of currency, followed by heavy taxation and economic loss in agriculture and industries so that the land went out of cultivation, the prevalence of malaria which sapped physical vitality (W. H. S. Jones), the moral degradation of the patrician classes, and the absence of any regeneration on their part (W. E. Heitland). After the fall of Rome came the dark ages with their constant wars, the monastic spirit with its contempt for the body and its claims to salvation, and as a result hygiene was like to become a lost art. As an exception Moses Maimonides (1135–1204) insisted on the importance of preventive medicine. But out of the appalling apathy and neglect of hygiene during the Middle Ages there arose two factors of importance in relation to public health: (1) the Christian sympathy and humanistic feeling for the sick and unfortunate led to the establishment of houses of refuge and hospitals; the Crusades (1100–1300) were followed by the spread of leprosy, or perhaps of other diseases regarded as such, and the numerous lazarettos then provided, whatever the underlying motive, for their isolation constituted a form of preventive medicine. (2) The recognition of the contagious nature of the pestilences of the Middle Ages—the plague, "the black death" (1346), the epidemic spread of syphilis at the end of the fifteenth century, and smallpox, and the resulting fear and panic led to the defensive practice of quarantine. Fracastorius (1483–1553) of Verona, the author of "Syphilis sive Morbus Gallicus" (1530) and "De Contagione" (1546), by imagining that invisible seeds (*seminaria contagionum*) were responsible for the spread of disease, anticipated the proof supplied by bacteriology in the nineteenth century. It is remarkable that the clear-headed ancient Greeks did not have any conception of infection as a cause of disease.

The progress of preventive medicine as seen in retrospect is closely related to that of medicine as a whole. In the seventeenth century Thomas Sydenham (1624–1689), "the Master of Practice," and William Harvey (1578–1657), "the Master of Science," exerted an influence that can never be forgotten. Sydenham, also called "the British Hippocrates" and "the Prince of Practical Physicians," was much concerned with the nature, incidence, and variations of epidemic disease, and his conception of "epidemic constitutions" has engaged much recent consideration from W. Hamer, Major Greenwood, and F. G. Crookshank; he has therefore been described as "the founder of the modern science of epidemiology." From Harvey's "De Motu Cordis" (1628) dates the rebirth of the experimental method.

In Tudor and Stuart times the British Government passed some isolated Acts with bearings on hygiene. The State being responsible for the well-being of the country should therefore protect the Nation against invasion by disease as well as by human enemies. In 1719 Richard Mead (1673–1754), the "first of the fathers of modern preventive medicine," was requested by the Lords of the Regency, through Mr. Secretary Craggs, to advise what measures should be taken in connection with the plague then raging at Marseilles; accordingly in his "Short Discourse concerning Pestilential Contagion and the Methods to Prevent it" (1720) Mead advocated isolation of the sick in proper places rather than general quarantine or fumigation. He also supported inoculation against smallpox and the adoption of Samuel Sutton's invention for the ventilation of the holds of ships.

The eighteenth, sometimes called the "philosophical," century did much to prepare the way for the sanitary reforms of the following century; indirectly it was effective in correlating physiology and pathology on the one hand with clinical medicine and surgery on the other hand, and in this process the great John Hunter (1728–1793) played a part. The observations of a number of individual investigators were of the greatest value to preventive medicine; G. M. Lancisi (1654–1720) while stating the doctrine of miasmas recommended the draining of marshes with a prophetic suspicion that malaria was spread by mosquitoes, thus anticipating the ideas of J. C. Nott (1804–73) in 1848 and of J. C. Finlay (1833–1915) in 1881, and the proof by Ronald Ross in 1898. In 1767 George Baker (1722–1809) proved that the Devonshire colic was due to lead poisoning and, though denounced from the pulpit as "a faithless son of Devon," was instrumental in employing substances other than lead in the machinery used in the manufacture of cider and thus was responsible for the disappearance of the colic. The orgy of intemperance in the second quarter of the century was somewhat diminished by Gin Acts passed before 1750.

In the second half of the eighteenth century medical men attached to the fighting services of Great Britain played an important part in preventive medicine. John Pringle (1707–1782) was a man of very wide interests, being successively professor of moral philosophy at Edinburgh, "Physician-General to his Majesty's Forces in the Low Countries and other Parts beyond the Seas," Physician-in-Ordinary to the King, and President of the Royal Society from 1772 to 1778, being the second of the nine presidents with medical qualifications, namely Hans Sloane (President 1727–1741), W. H. Wollaston, Benjamin Brodie, J. D. Hooker, T. H. Huxley, J. Lister, C. S. Sherrington, and Gowland Hopkins. He was the founder of military medicine and hygiene; in his "Observations on the Diseases of the Army" (1752) the principles of sanitation, proper drainage, latrines in camps, and ventilation of hospital wards were laid down; he was a pioneer of antiseptics, and advocated immunity of military hospitals from hostile attack, thus originating the Red Cross which was finally established by Henri Dunant (1828–1910) in the Geneva Convention of 1864. Pringle's mantle in the nineteenth century was worn by E. A. Parkes (1819–1876) who was described as "the founder of modern military hygiene" and as "the best teacher of military hygiene in our day, the friend and benefactor of every soldier."

James Lind (1716–1794), "the Father of Nautical Medicine and Hygiene," who was physician to the Royal Naval Hospital, Haslar, from 1758 to 1783, though a different personality from Pringle, did equally good work for "the silent Service." The recommendations about the prophylactic value of fresh fruit, especially oranges and lemons, and vegetables, contained in his "Treatise on the Scurvy" (1754), when officially enforced, after forty-one years of unnecessary and fatal delay, by the powerful influence of Gilbert Blane (1749–1834) banished scurvy from the Royal Navy as if by magic; it preceded by more than a century the recognition of the true nature of other deficiency diseases. Unfortunately Lind did not live to see this success and did not receive due recognition or honors. His "Essay on the most effectual Means of preserving the Health of Seamen in the Royal Navy" (1757) established the principles of naval hygiene, ventilation and fresh air; a practical reform advocated by him was the simple method of obtaining potable water by the distillation of sea-water. As his "Essay on Diseases incidental to Europeans in hot Climates" (1768) dealt not only with the prevention and cure of tropical diseases but also with climate and its influence on disease, he must be gratefully recognized as a very early pioneer in tropical medicine. Blane and Thomas Trotter (1760–1832) followed Lind in their efforts on behalf of naval hygiene. The prisons of England, from which the press-gangs imported men and typhus fever into the Services benefited from the activities of Stephen Hales (1677–1761) who in 1740 provided ventilators for ships and later for prisons. In 1774 John Howard (1725–1790), the philanthropist, brought the terrible conditions in jails prominently to the notice of the public. The isolation of typhus fever patients was preached in 1778 and practiced in 1783 by John Haygarth (1749–1827) of Chester; John Ferriar (1761–1815), after studying severe epidemics of typhus fever in Manchester in 1789 and 1790, pressed in 1792 for the establishment of separate fever wards to control the spread of the disease. This led after determined opposition to the establishment of "Houses of Recovery" which, though really fever wards, were given this title so as to avoid the alarm that would otherwise have been created among the poor. According to Emrys Jones, attempts to limit the spread of plague had been made earlier in the middle of the eighteenth century by moving the patients to huts outside the city of Manchester.

During the eighteenth century a number of large voluntary hospitals sprang up in London and the provinces; though the obvious function of hospitals is curative or restorative treatment, some idea of preventive measures must always emanate from them, for example in the detection of the causes of disease and in advice how to escape further trouble, and in the correction of unhealthy habits and conditions. Modern well-equipped hospitals, especially when provided with social workers, who follow patients into their homes to investigate and help in obviating circumstances adverse to health, are efficient in promoting preventive medicine.

The industrial revolution (1760–1820) and the steam engine changed the inhabitants of Britain from rural to urban dwellers and greatly increased trade, wealth, and the population. But overcrowding in the slums of cities and insanitary conditions in factories damaged the health of the workers, especially of the young children employed there for long hours. The industrial revolution thus transformed the conditions of life among the poor and divides the eighteenth century from the modern life. Thomas Percival (1740–1804) and John Ferriar of Manchester protested against these appalling conditions of labor which were eventually improved by bills passed as a result of the exertions of the seventh Lord Shaftesbury (1801–1885) in 1833 as regards factories and in 1842 as regards mincs. The foundations on broad lines of modern public hygiene were laid in the four volumes of the "Complete System of Medical Polity" (1777–1788) of Johann Peter Frank (1745–1821), the Bavarian, who insisted that the care of the citizens' health was the duty of the State. In Great Britain John Roberton's "Treatise on Medical Police" (1808) dealt with the prevention of disease in Edinburgh and London, and David Hosack in 1820 followed his example in reference to New York.

The eighteenth century closed with one of the greatest triumphs of preventive medicine—vaccination or the active immunization against smallpox, discovered by Edward Jenner (1749–1823), "one born out of due time," whose "Inquiry into the Causes and Effects of Variolae Vaccinae" appeared in 1798. This had a practical effect in medicine comparable to the introduction of the antiseptic method in surgery first made public in 1867 by Joseph Lister (1827–1912). Jennerian vaccination superseded the protective inoculation of material from human cases of smallpox, a method long practiced in the Orient and introduced into England about 1721, partly by the influence of Lady Mary Wortley Montagu; it fell into abeyance from 1728 to 1740, after which it was revived. It was not until nearly a century later that Jennerian vaccination was further developed by Pasteur in protective vaccination by attenuated viruses and by the vaccine treatment of Almroth Wright (1861–), especially against enteric fever in which Leishman, the discoverer of the parasite of kala-azar (Leishmaniasis), played an important part.

In the first half of the nineteenth century Great Britain set the example of State supervision of the Nation's health. The cholera epidemics of 1831–2, 1849, and 1853–4 and the energy of Chadwick and others drove the Government to adopt measures of sanitary reform. Knowledge of the ways in which diseases spread, especially water-borne infections, increased; in 1849 and 1855 John Snow (1813–1858), almost the first anesthetist, "a teetotaller when there were only few and also a vegetarian," proved that cholera is a water-borne disease; William Budd (1811–1880) of North Tawton and later of Bristol was chiefly responsible for proving in 1873 that the same is true of typhoid fever which had been differentiated from typhus fever by a pupil of Louis, W. W. Gerhard (1809–1872), of Philadelphia in 1837, by A. P. Stewart (1813–1883) of Edinburgh in 1840, and William Jenner (1815–1898) of London in 1849.

Edwin Chadwick (1800–1890), not a medical man but a disciple of Jeremy Bentham (1748–1832), who has been called "the spiritual father of public health legislation" (Singer), labored in the cause of public health for sixty years, and more than anyone else made the State realize its responsibility for the health of the nation. In thus organizing State medicine he was ably seconded by, and associated with, Lord Shaftesbury, who, in addition to his numerous charitable activities, presided over the foundation of the Epidemiological Society in 1850, and by Dr. Thomas Southwood Smith (1788–1861), also a pupil of Jeremy Bentham. From 1832 to 1854 Chadwick was in an official position under the Government and was most active, to borrow William J. Collins' phrase, as a "practical idealist," in promoting sanitary reform. The Public Health Act of 1848 set up a General Board of Health with Lord Shaftesbury as chairman, and as paid members Chadwick and later Southwood Smith. Although this appointment came to an end in 1854, Chadwick continued his pioneer work for the "sanitary idea" as he called it. In 1864 he visited Paris and was asked by Napoleon III what he thought of his improvements; his reply "Sir, Augustus found Rome brick and left it marble; if your Majesty having found Paris stinking will leave it sweet, you will more than rival the first Emperor of Rome" was taken in good part, and steps were directed to be taken to improve the sanitary conditions of the city. Chadwick was a warm supporter of Florence Nightingale. In America Lemuel Shattuck (1793–1859) has been called "the Chadwick of America"; a layman and publisher in Boston, he proposed in 1850 a scheme of public health organization of even more far-reaching extent than those of Chadwick. But it did not have any immediate effect.

John Simon (1816–1904), whose two grandfathers were Frenchmen, was surgeon to St. Thomas's Hospital where for six years he had been an apprentice to the philosophical surgeon Joseph H. Green (1791–1863), and in his early professional career was much interested in metaphysics and oriental languages. In October, 1848 he was appointed the first Medical Officer of Health for the City of London, and in 1854 his reports were unofficially reprinted and vigorously set out "the national prevalence of sanitary neglect" and the urgent need of control of the public health by a responsible Minister of State. In 1855 he became the Medical Officer of the reconstituted General Board of Health. In 1869 the Royal Sanitary Commission, consisting of James Paget, Henry Acland, Robert Christian, and William Stokes was appointed and recommended the creation of a Ministry of Health; this was not done, but in 1871 the Local Government Board was set up and took charge of public health until eventually the Ministry of Health was established in 1919. Simon became the Chief Medical Officer of the Local Government Board, but his power of initiation was hampered and eventually he retired in 1876. During his twenty-eight years of official work he carried on Chadwick's progressive policy with great energy; in 1887 the reports he had written during the period 1848–1876 were published in two volumes, and in 1897 he brought out the second edition of his "English Sanitary Institutions, reviewed in their Course of Development and in some of their political and social Relations"; this masterly survey contained an elaborate vindication of his official career.

Benjamin Ward Richardson (1828–1896) was the follower, friend and biographer of Chadwick, an advocate of "Hygeia" a "model city of health" (1875), of total abstinence, and of a Ministry of Health. The founder of experimental hygiene was the versatile Bavarian Max von Pettenkofer (1818–1901) whose views on the influence of the relation of the soil to the water-borne infection of cholera and typhoid fever led to much discussion.

INDUSTRIAL MEDICINE

The existence of occupational diseases must have been known in ancient times, for some extremely dangerous trades, such as those concerned with lead, mercury, and pottery, are of great antiquity. Pliny spoke of "the diseases of slaves," but apparently little or no attempt was made to protect them against what was regarded as their business.

Trade diseases and industrial medicine were first systematically considered by Bernadino Ramazzini (1633–1714), professor of Medicine at Padua, in "De Morbis Artificium Diatriba" published in 1701 at Modena; this was "done in English" in 1705 with the title "A Treatise of the Diseases of Tradesmen; shewing the various Influence of particular Trades upon the State of Health; with the best methods to avoid or correct it, and useful Hints proper to be minded in regulating the Cure of all Diseases incident to Tradesmen." The word "Tradesmen" in this connection strikes somewhat strangely on modern ears, but its first meaning in the "New English Dictionary" reads "one who is skilled in and follows one of the industrial arts—an artificer, an artisan, a craftsman"; the second meaning "a shopkeeper" is that now more familiar. The preface very modestly anticipates many defects in a book on a new subject and concludes "So I choose to publish this Treatise of mine for the good of the Republic, or at least for the benefit of tradesmen; and tho' 'tis not very artfully writ, I hope the Reader will vouchsafe it a civil reception." Each of the forty-three chapters deals with a group of workers; the first described the diseases in miners and is followed by those on workers in metals, lead poisoning in potters, the silicosis of stone masons, silk dust, and other occupational diseases, the last being on "the diseases of learned men," to which S. A. D. Tissot refers in his "De Valetudine Litteratorum," 1766. Considerable attention is paid to the ocular disabilities due to working in a bad light. The observations of others are mentioned, and in some respects, as in the case of pneumoconiosis, he followed in the footsteps of the wandering and originally minded Paracelsus (1493–1541).

Ramazzini was born on November 5, 1633, at Carpi, and died on the same day of the month eighty-one years later; he thus resembled Sir Thomas Browne (1605–1682) who was born and died on October 19. After education in the humanities by the Jesuits, he studied philosophy and medicine at Modena where he received the doctorate on February 21, 1659. After practicing in the Duchy of Castro, at Carpi and Modena, he was appointed Professor of Medicine at the University of Modena founded by Francis II, in 1682. He was called to the chair of practical medicine at Padua in 1700, and eight years later was appointed to the higher chair of medicine; being blind and infirm he wished to decline his promotion, but the Senate, anxious to honor a great man, insisted and enacted that he should lecture only when he felt able to do so.

With wide interests outside medicine he made a number of contributions on professional and other subjects, such as the abuse of cinchona treatment (1714) on epidemiology, namely the outbreak of lathyrism at Modena in 1690 and the epidemic of cattle plague at Padua in 1712. He also wrote on meteorology (1695), petroleum (1690), and, in connection with his age, "Annotationes in Librum Ludovici Cornelii de vitae sobriae Commodis" (1713).

Charles Turner Thackrah (1795–1833) was the author in 1831 of the first systematic publication in Great Britain on industrial disease and its prevention. This was a tract of 126 pages with even for those times the phenomenally comprehensive title: "The Effects of the Principal Arts, Trades and Professions and of the Civic States and Habits of Living on Health and Longevity with a particular reference to the Trades and Manufactures of Leeds, and Suggestions for the Removal of many of the Agents, which produce Disease and shorten the Duration of Life." In this brass-founders' ague and dust diseases were investigated. A second edition came out in 1832. While often quoting from Bernadino Ramazzini's "De Morbis Artificium Diatriba," Thackrah rightly said that as "scarcely anything had been published even on the employments common to England at large" he had "to enter a new track without guide or assistance." He was a man of abounding energy, and as he is not noticed in the "Dictionary of National Biography" it may in view of his pioneer effort be right to give some details of his short but active life.

Born on May 22, 1795 at Leeds he did not feel able to carry out his mother's wish that he should enter the church, and in 1811 he started work in the surgery of Dr. O. Brooke in that city. In the following year he began to keep a diary in Latin, and in 1814 entered as a pupil at the Leeds Infirmary. The winter of 1815–16 was spent in London, at Guy's Hospital where he qualified L.S.A. and M.R.C.S. in 1816, and obtained the Physical Society's prize for an essay on "Diabetes"; he contracted some chronic gastrointestinal disorder (? chronic appendicitis or colitis) which appears to have bothered him for the rest of his life. In the following year he returned to practice in Leeds. In 1818 he gained a prize given by Sir Astley Cooper for an essay entitled "An Inquiry into the Nature and Properties of the Blood in Health and Disease" which was published in 1819 with a dedication to Sir Astley Cooper. In 1834 it was brought out in a new and revised form by T. G. Wright, M.D., with a biographical memoir of Thackrah from which most of this information has been taken. The opening paragraph of the memoir rather quaintly remarks that the way of unusually able men is hard, especially when they have a delicate frame of body, for then "the earthly tabernacle proves a frail habitation for its etherial (*sic*) tenant, and the victim of science sinks exhausted into a premature grave." On page 96 of Wright's edition of the "Inquiry" it is stated that the manuscript from which this section is transcribed was read to the Royal Society under the title of "An Experimental Examination of Blood found in the Vena Portae," May 19, 1831. It is noticed in the Lancet, 1831, xxvii, 450, though incorrectly stated to be written by Dr. James Thackeray. Reference to the original source* shows that the Lancet correctly reproduced the mutilated name of the author who was introduced by Sir Astley Cooper, a vice-president of the Society.

In 1819-20 Thackrah drew up a striking report on the miserable and pernicious state of the inferior class of lodging houses, thus evidently collecting material for his work on industrial disease and its prevention. In 1820 he began to lecture on physiology, later he taught practical anatomy, and in 1826 was anxious to start an anatomical school. He continued to lecture and took an active part in founding the Leeds School of Medicine in 1831 where he lectured, in the sessions of 1831–2 and 1832–3, on no fewer than four subjects: anatomy, physiology, pathology, and surgery. In the meanwhile he published "Lectures on Digestion and Diet," had married twice (1824 and 1830), and in 1832 when the great cholera epidemic spread from Sunderland, where quarantine and other preventive measures had been abandoned, visited Gateshead and Newcastle to investigate it. He was a member of the original council of the provincial Medical and Surgical Association which was founded on July 19, 1832, at Worcester and, as the British Medical Association, has recently celebrated its centenary in London. He died on May 23, from pulmonary disease which had complicated his abdominal disorder.

***Proc. Roy. Soc.*, 3: 53, 1831.

Later in the nineteenth century the knowledge of industrial disease and medicine was advanced by the individual efforts of E. H. Greenhow (1814–1888) on pneumoconiosis, of Thomas Oliver (1853–) of Newcastle on lead poisoning, a subject studied in America by Alice Hamilton. The Medical Inspectors of Factories working under the Home Office and the Workmen's Compensation Act have systematized and greatly extended the knowledge of industrial risks. The National Institute of Industrial Psychology, under the directorship of C. S. Myers (1873–) has thrown much light on the incidence and the prevention of accidents and illness among industrial workers. With the advance of the chemical and physical sciences and the invention of the internal combustion engine in 1885, there have developed new methods of industry some of which involve the use of agents dangerous to the health of the workers, such as certain oils, for example in mule-spinners' cancer, tars, asbestos, aniline dyes, benzol, *x*-rays, and radium. The Harvard School of Public Health, Boston, Mass., and the Drinkers have by experimental research done much to increase accurate knowledge of industrial diseases and so of their prevention.

TROPICAL MEDICINE

Diseases special to tropical countries had attracted considerable attention in the eighteenth century, particularly in the writings of Pringle and Lind. But, as in Medicine generally, the prevention of tropical diseases has undergone an extraordinary development as the result of the influence of protozoology and bacteriology. To Patrick Manson, "the Father of *modern* tropical Medicine" this is mainly due, on account not only of his own research work but of his untiring energy in stimulating others and initiating schools for teaching tropical medicine, in which he had the powerful help of Joseph Chamberlain, the great Colonial Secretary. Perhaps more obviously than ordinary medicine, tropical medicine is inextricably blended with hygiene and preventive measures.

The knowledge that infective diseases are spread by animal vectors and human "carriers" is largely due to observations made on tropical diseases. In 1877 Manson, then at Amoy in China, showed that *Filaria bancrofti*, the cause of filarial elephantiasis in man, develops in, and is transmitted by, the culex mosquito. In 1889 Theobald Smith (1859–) proved that the cattle tick conveys the virus of Texas fever. Many other examples of the spread of disease by "carriers," human as well as animal, have since been established, and preventive bacteriology by the detection of healthy human carriers of the microorganisms responsible for enteric fever, diphtheria, cerebrospinal fever, and other infections, has become an important routine practice. In 1898 Ronald Ross (1857–1932) proved that the malaria parasite, discovered by A. Laveran in 1880, is conveyed by mosquitoes, as Manson had in 1894 predicted on the analogy of filarial infection; in 1901 Walter Reed (1851–1902) showed that the stegomyia mosquito is the vector of the yellow fever virus. Extensive anti-mosquito campaigns have been carried out, especially by the International Health Division of the Rockefeller Foundation of New York which has for its motto "The Well-being of Mankind throughout the World." Plague is conveyed by the fleas on rats, and the destruction of rats is the method of preventing plague. A most striking demonstration of how the tropics can be made safe for the white races is the successful completion of the Panama Canal as the result of the sanitary organization of W. C. Gorgas (1854–1922). Undulant, Malta, or Mediterranean fever was shown to be due to the *Micrococcus melitensis* in 1887 by David Bruce (1855–1931) and in 1906 the disease was proved to be conveyed to man in the milk of goats, a discovery which rendered its prevention effective. African sleeping sickness was, by a long series of investigations by Bruce, A. Castellani, and others, shown to be caused by a trypanosome conveyed from wild game by tsetse flies. The treatment of amebic dysentery by emetine, for which Leonard Rogers was mainly responsible has diminished the incidence of liver abscess, a grave sequel. There are other pioneers of tropical hygiene deserving the gratitude of mankind. Of Raphael Blanchard (1856–1919) the Professor of Parasitology in the University of Paris, Patrick Manson said that in England he was regarded as the referee par excellence in any matter relating to tropical parasitology.

Prevention of Infectious Fevers

Prophylactic immunization against enteric (typhoid and paratyphoid) fever by a vaccine introduced by Almroth Wright was employed in the South African War (1899–1902) and was marvellously successful in the Great War (1914–1918). By the Schick (1911) and the Dick (1923) tests it can be shown whether or not an individual is susceptible to diphtheria and scarlet fever respectively; the individual if likely to contract the disease can be actively immunized by the subcutaneous injection of toxin-antitoxin (diphtheria), and in the case of scarlet fever by its toxin. Injection of anti-tetanic serum in the case of wounds has been proved to be most efficient. In measles those exposed to infection can be protected against the disease by injection of serum from convalescents or those who have had measles.

The campaign against puerperal infection was begun in 1773 by Charles White (1728–1813), surgeon to the Manchester Infirmary, carried on by A. Gordon of Aberdeen in 1795, by Oliver Wendell Holmes (1809–1894) of Boston, Mass., in 1843, and notably by I. P. Semmelweis (1818–1865) of Vienna in 1861 who was the pioneer in its antiseptic prevention. In Great Britain John Williams (1840–1926) and Francis Champneys (1848–1930) were in 1880 the first to establish Listerian antiseptic midwifery in a lying-in hospital with immediate success. Antenatal clinics have been established to reduce the mortality and morbidity resulting from childbirth.

Disease of the teeth, pyorrhea and dental caries, is a potent cause of ill-health, rheumatism and fibrositis, and of gastrointestinal and other disorders, as was insisted on by William Hunter (1861–   ) and Frank Billings (1854–1932). The establishment of dental clinics for the inspection and treatment of school children is an example of preventive medicine. The importance of other focal infections, such as those of the tonsils, accessory nasal sinuses and prostate, in the causation of disease in other parts of the body is now fully recognized.

The physiological prevention of disease has greatly advanced; Lind's work in connection with scurvy in the eighteenth century has already been mentioned. In this century Gowland Hopkins' work on vitamins was followed by the recognition of a group of deficiency diseases, the avitaminoses, due to the absence of "accessory food factors" essential to health of which, in addition to scurvy, there are now examples in beri-beri, rickets, and other morbid states. Quite recently R. B. Bourdillon and his colleagues at the National Institute for Medical Research at Hampstead, London, isolated from irradiated ergosterol a crystalline compound, provisionally called "calciferol" which weight for weight has 400,000 times the value of a good sample of cod-liver oil in preventing rickets; one ounce of calciferol, dissolved suitably, could provide the necessary daily ration for more than a million children. This is a dramatic example of the value of research to preventive medicine.

The prevention of goiter by the administration of iodine has been carried out on a large scale, especially in Switzerland and in the area of the Great Lakes in North America (Marine). In connection with the subject of deficiency diseases it may be pointed out that, although excess of food may cause obesity, gout, high blood-pressure, and chronic kidney disease, and excess of alcohol a number of ailments, there is not any evidence that abstinence from alcoholic drinks is responsible for any disease.

THE FUTURE OF PREVENTIVE MEDICINE

According to René Descartes (1596–1650), "We could be free of an infinitude of maladies both of body and mind, and even also of the infirmities of age, if we had sufficient knowledge of their causes, and of all the remedies with which Nature has provided us." This may raise the questions of the objectives and the future of preventive medicine.

Improved quality of health and the disappearance of premature death rather than great length of days appear to be the most probable line of success for preventive medicine. The great increase in the average expectation of life at birth between 1854 and 1922, namely from 40 (males) and 42 (females) to 55.6 (males) and 59.6 (females) years, is mainly due to the gratifying diminution in infantile mortality (in the first year of life) from 149 per thousand in the decade 1871–1880 to 60 per thousand in 1930. As a result of the fall in both the birth-rate and the death-rate the population of Great Britain is becoming older; but this does not mean that there is any certain evidence that the prospect of extension of life to the ideal physiological age of 100 years is in process of realization. The significance of the expectation of life is very different (a) at birth and (b) at seventy; the increase at the advanced age is very slight, and indeed Raymond Pearl, Warthin and others have quoted statistics showing a fall in the expectation of life at about the age of seventy now as compared with that in the remote past when there was a survival of the fittest as contrasted with some degree at any rate of the saving of the less fit. On the other hand heredity is such a predominant factor in longevity that there can be little doubt that if members of long-lived families were carefully chosen and mated in favorable circumstances they would confer this property on their offspring.

Eugenic measures may also diminish the incidence of hereditary diseases by influencing those who may transmit them to abstain from propagating their species.

What will be the future of preventive medicine as a whole? It has been rightly urged, especially by George Newman, that it should permeate medicine throughout, and be as much an essential part of it as is treatment. This should in time lead to a very considerable diminution in the incidence of disease and therefore in the need and demand for treatment. This indeed was voiced by Almroth Wright in 1909 in the dictum "The physician of the future will be an immunisator"; but it must be a rather distant realization.

Periodical medical examination of adults, a stock-taking of health, analogous to periodic visits to the dentist, so as to give timely warning of the early and insidious stages of disease, such as high blood-pressure, kidney and nervous diseases, is a measure of preventive medicine worthy of serious consideration. Advice about methods of life, food and drink, occupation and environment would often prevent disease and premature death. This has been found by Life Assurance Companies in America to be so effective as to make it a good business proposition to provide such periodic examinations gratis to their clients.

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TWO NOTABLE CONTROVERSIES: OVER THE INVENTION OF THE ELECTRIC TELEGRAPH AND THE DISCOVERY OF SURGICAL ANESTHESIA*

By ALBERT H. MILLER, M.D.

PROVIDENCE, R. I.

> "Before October 16, 1846, surgical anaesthesia did not exist—within a few months it became a world-wide procedure; and the full credit for its introduction must be given to William Thomas Greene Morton, who, on the date mentioned, demonstrated at the Massachusetts General Hospital, the simplicity and safety of ether anaesthesia."—WILLIAM OSLER.

THE lives of three men form a curiously interwoven pattern in the web of scientific progress woven in the early part of the nineteenth century.

Samuel Finley Breese Morse was born in Charlestown, Mass., April 29, 1791. After graduating from Yale University, he followed a natural inclination toward art and became one of the foremost portrait painters of his time. In 1832, he invented the electric telegraph and thereafter lost all interest in painting. He devoted the rest of his life to the development of his invention.

Charles Thomas Jackson was born at Plymouth, Mass., June 21, 1805. He graduated from Harvard Medical School and started practice in Boston. Not meeting with success in his profession, he turned his attention to geology and chemistry. He claimed both the invention of the telegraph and the discovery of anesthesia. In 1873, he was adjudged insane and was committed to an asylum.

William Thomas Greene Morton was born at Charlton, Mass., August 9, 1819. He graduated from the Baltimore College of Dental Surgery and practiced dentistry in Boston with marked success. In 1844, he entered Harvard Medical School and attended lectures for the next two years. In 1846, he demonstrated surgical anesthesia and thereafter lost all interest in dentistry. He devoted the remainder of his life to the development of his discovery.

The packet ship, *Sully*, had lain at her berth in the harbor for several days, waiting for favorable weather, but, on October 6, 1832, set sail from Havre for the voyage to New York. Among the passengers were Samuel F. B. Morse, the eminent portrait painter, and Charles T. Jackson, a young physician, fresh from studies in European clinics, now returning home to take up the practice of medicine and surgery in the City of Boston. Jackson had graduated from Harvard Medical School in 1829. In his college days, he was most interested in the study of geology and interrupted his medical course to take a long tramping trip, during which he made a geological survey of Nova Scotia. In the fall of 1829, he crossed the Atlantic in order to secure the benefit of study in European centers. His time was not entirely occupied with medical study. In Paris, he formed an intimate acquaintance with M. Elie de Beaumont, eminent geologist and member of the French Academy. He interrupted his medical studies to take a long walking trip, in the course of which he encountered a severe epidemic of typhus in Vienna.

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* Read at a meeting of the Boston Medical History Club.

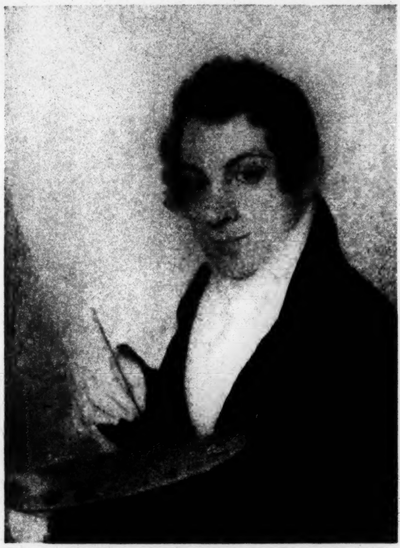

FIG. 1. SAMUEL F. B. MORSE, PROBABLY DONE WHILE AT YALE COLLEGE, 1809–1810. MINIATURE SELF-PORTRAIT ON IVORY, 3½ × 2¾ IN. OWNED BY AND REPRODUCED BY PERMISSION OF NATIONAL ACADEMY OF DESIGN, NEW YORK CITY.

Morse, entering Yale at the age of fourteen, had studied physics and chemistry with such zeal that he had been chosen as laboratory assistant by the celebrated Professor Benjamin Silliman. In his spare hours, he had painted portraits and had earned a considerable part of his college expenses by painting miniatures on ivory at five dollars each. After graduation, he succeeded in overcoming the objections of his parents and persuaded them that "he was made to be a painter." Trained at home and abroad by such men as Gilbert Stuart, Washington Allston, and Benjamin West, he early succeeded in this profession. He painted portraits of DeWitt Clinton, the Henry Clay which hangs in the Metropolitan Museum of Art, President John Adams, President Munroe for the City Hall in Charlestown, S. C., and the portraits of Lafayette which hang in the New York City Hall and in the Forty-second Street Library. In the fall of 1829, saddened by the loss of his wife and both his parents, Morse placed his three small children in the care of relatives and sailed for Europe. During the next three years, he studied in European galleries. There he painted the portrait of the sculptor, Thorwaldsen, which was presented to the King of Denmark. A skilled portrait painter, financially prosperous and widely celebrated, he was returning home on the *Sully* to continue work in his chosen profession.

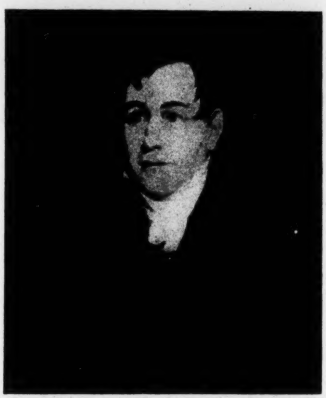

FIG. 2. DR. CHARLES T. JACKSON. FROM PORTRAIT PAINTED BY SAMUEL F. B. MORSE.

For forty days, the *Sully*, tossed about by October gales, made slow headway across the Atlantic. During this time, Jackson demonstrated to his fellow passengers the electro-magnet first described by Professor Henry only a year before, one of which he had bought from the house of Pixer and Sons, shortly before leaving Paris. Morse worked out and put on paper the plan of the electro-telegraph. This, first of the great discoveries to make practical use of electricity, was an adaptation of the electro-magnet, but was much besides. It comprised the transmission of messages over a single, electrically charged wire; the system of carrying the wire either "through underground pipes filled in with pitch or resin, or laid through the air on stout spars, 30 feet high and 350 feet apart"; the instrument for sending and receiving messages; the relay, for indefinitely increasing the distances over which messages could be transmitted; and the code of dots and dashes. In constructing the first telegraph instrument, Morse used a canvas-stretcher, designed to support some notable portrait. The dot and dash code was perfected after learning, from a study of the type in a printer's office, what letters were most used.

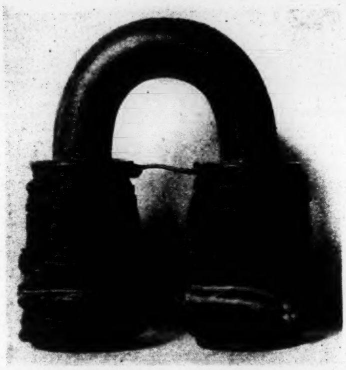

FIG. 3. JACKSON'S MAGNET. "ELECTRO-MAGNET BOUGHT OF PIXER & SONS, PARIS, JUNE OR JULY, 1832 AND HAD BY ME ON BOARD SHIP *Sully*, OCT., 1832, WHEN I SHOWED MORSE ABOUT THE TELEGRAPH. C. T. J." FROM COLLECTION OF MASSACHUSETTS HISTORICAL SOCIETY.

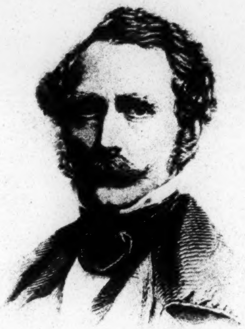

FIG. 4. WILLIAM THOMAS GREENE MORTON. FRONTISPIECE TO RICE'S "TRIALS OF A PUBLIC BENEFACTOR."

Met by his brothers when he landed at New York, Morse was full of the subject of his telegraph. In enthusiasm for his invention, he rapidly lost interest in portrait painting. He exhausted his private funds, but, in 1843, Congress granted him an appropriation of $30,000, and in May of the following year, the first telegraph line, connecting Washington and Baltimore, was completed. Morse offered his invention to the United States Government for $100,000, but when Congress finally was ready to buy, the price had risen to as many millions.

Dr. Jackson, on his arrival in Boston, opened an office for the practice of medicine and surgery, but having little success, transferred his efforts to chemistry and geology. He fitted up a laboratory for chemical analysis in his house at 27 Somerset Street and conducted classes for students in chemistry. In 1836, he obtained an appointment as Geologist to the State of Maine and in the two following years, with headquarters in Bangor, made a geological survey of the state.

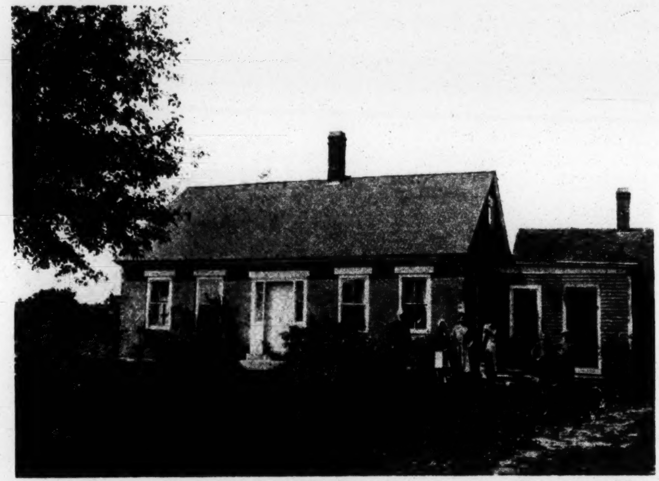

FIG. 5. HOUSE WHERE WILLIAM T. G. MORTON WAS BORN, A MILE FROM CHARLTON, MASS., ON OLD ROAD FROM CHARLTON TO OXFORD. PHOTOGRAPH BY THE AUTHOR, SEPT. 5, 1931.

A letter from Dr. Jackson, dated at Bangor, in May, 1837, claiming that the telegraph was Jackson's own invention, came to Morse as a complete surprise. *The Boston Post*, in May, 1839, stated:

> We are informed that the invention of the electro-magnetic telegraph, which has been claimed by Mr. S. F. B. Morse of New York, is entirely due to our fellow citizen, Dr. Charles T. Jackson, who first conceived the idea of such an instrument during his return voyage from Europe in the packet ship *Sully* in October, 1832.

This claim Jackson continued to press until Morse found him a "thorn in the flesh" and could find no excuse for his conduct except to think him insane. Of an affidavit made by Jackson in 1849, Morse wrote: "There never was a more finished specimen of wholesale lying than is contained in it. He is certainly a monomaniac, no other conclusion could save him from an indictment for perjury."

In 1839, located at Providence, Dr. Jackson made a geological and agricultural survey of the State of Rhode Island and presented a report in May of the following year. In 1841, he commenced an extensive geological survey of the State of New Hampshire. Completing this survey in 1844, he next explored the mining district to the south of Lake Superior and then returned to his laboratory in Boston, for the time dependent upon his classes in chemistry.

James, father of William T. G. Morton, was a Free Quaker who in his early years successfully conducted a farm in Smithfield, R. I. At the time of his marriage, he moved to Charlton, Mass., where his wife's family occupied a farm of one hundred acres, a mile from the town. There Morton was born and lived until his eighth year, when the family moved into Charlton town to secure educational advantages for the children. In his seventeenth year, Morton secured a position in Boston, in the office of a religious journal, the *Christian*

Witness, where he remained for several years. In 1840, he began study of dentistry at the Baltimore College of Dental Surgery and two years later, after graduation, opened a dental office in Boston in company with Horace Wells. The partnership was not immediately successful and Wells soon withdrew and moved to Hartford, Conn. Morton invented a non-corrosive solder for fastening artificial teeth to gold plates, and confining his work to mechanical dentistry, soon acquired a large practice. At his office at 19 Tremont Row, he had several assistants and technicians working in his laboratory.

At the same time, Morton was paying serious attention to Miss Elizabeth Whitman, a young lady of Farmington, Conn. Miss Whitman's family included several Harvard graduates and was old and distinguished. Her uncle, Lemuel, was at this time at Yale, a room-mate of John C. Calhoun, and later became a member of Congress from Connecticut. Miss Whitman's parents expressed serious objections to the suit of the young dentist who was making frequent trips from Boston to visit their daughter, but Morton was a good looking young chap with a pleasing personality and his financial condition was satisfactory. On his promise to take the course at Harvard Medical School and to become a regular practitioner, they finally consented to the match. In March, 1844, Morton matriculated at Harvard and chose as Preceptor, Dr. Charles T. Jackson. In May, he was married to Miss Whitman, then in her eighteenth year. During the next two years, rising at four or five in the morning, he conducted his practice of dentistry, studied chemistry in Dr. Jackson's laboratory and attended the course of lectures at Harvard Medical School. His dental practice was paying him over $10,000 a year. In 1846, he bought a large tract of land in West Needham, now Wellesley, Mass. and started the construction of a country house and

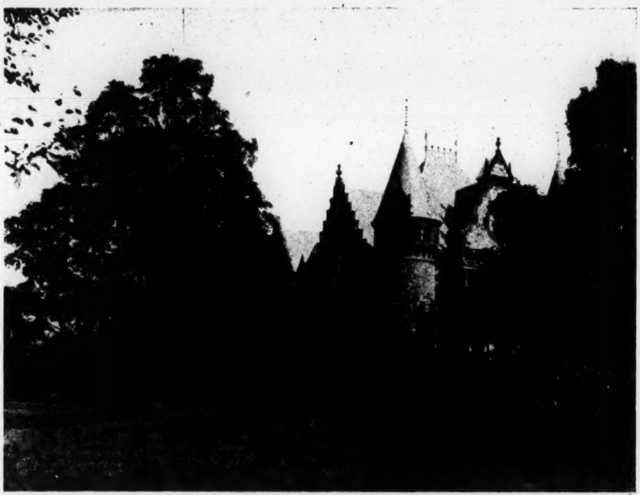

FIG. 6. WELLESLEY PUBLIC LIBRARY ON SITE OF DR. MORTON'S HOUSE AT WEST NEEDHAM. PHOTOGRAPH BY THE AUTHOR, SEPT. 27, 1931.

a cottage for his parents, on the site now occupied by the Wellesley Public Library.

From the first, Morton had studied the problem of extracting teeth without pain. The presence of decaying roots was a constant impediment to his work of fitting improved artificial teeth. In 1844, his partner, Horace Wells, experimented with nitrous oxide gas but failed in his public demonstration. Morton carried on a series of experiments on animals, using ether vapor. On September 30, 1846, he succeeded in producing insensibility to pain for a dental extraction and on October 16, following, administered ether to a patient in the old amphitheater of the Massachusetts General Hospital while Dr. John Collins Warren excised a tumor of the neck. This demonstration, in the presence of his fellows and members of the staff of the hospital, was a trying experience for the young student but was successfully carried out.

The staff of the hospital were enthusiastic and the interest and support of its members were largely responsible for the success of the demonstration and the rapid introduction of etherization. Dr. John Collins Warren and Dr. George Hayward performed the early operations under etherization. Dr. J. Mason Warren and Dr. Henry J. Bigelow took an active interest in Morton's experiments and were frequent visitors at his laboratory. Dr. Oliver Wendell Holmes coined the word "anaesthesia" to describe the new condition. Dr. Henry J. Bigelow made the first scientific announcement of the discovery in a paper, "Insensibility during Surgical Operations produced by Inhalation," read before the Boston Society for Medical Improvement on November 9. Realizing the importance of this announcement, he had visited Dr. Holmes the previous evening and the two had worked on the paper until late into the night.

Morton promptly informed those most interested that the substance which he was using was sulphuric ether and announced this fact publicly on November 7. On November 12, he was granted a patent on the process of etherization as "An Improvement in Surgical Operations" but the patent was soon found to be void "as not within the statutory limits of patentability" and served no purpose except to widely advertise the process of etherization. The discovery received prominent notice in the Boston newspapers and was widely reported in the medical journals. Morton worked early and late, neglected his dental practice and gave up his medical career. He wrote and published numerous circulars and pamphlets describing the use of ether and in September, 1847, published a 44 page manual on "The Proper Mode of Administering the Sulphuric Ether by Inhalation." He employed assistants to travel wherever requested and demonstrate the method of etherization. He opened a "Letheon Institute" at his office at 19 Tremont Row where dental patients could receive the benefit of anesthesia free of charge. He was even willing to pay people to take ether. Altogether he spent more than $100,000 on the introduction of anesthesia. He used his whole capital and mortgaged his West Needham home.

Morton reasoned: "All the world will be interested and will rejoice with me, and the medical profession will be eager to welcome this new means of helping and perfecting the healing art." He was mistaken. The reaction to his discovery was incredulity followed by hostility. Boston dentists, at a mass meeting led by Dr. J. F. Flagg, pronounced etherization a dangerous humbug, not to be used. A Baltimore dentist wrote:

> I protest against the whole business because I verily believe the great discovery to be utterly useless. If we are to induce insensibility by this class of means, I very much prefer whisky punch to ether because it is more certain and more permanent in its effects, it is less dangerous and lastly, it will be easier to persuade patients to take it.

From the *London Chemist:*

> Pain during surgical operations is, in the majority of cases, even desirable; its prevention or annihilation is, for the most part, hazardous to the patient. In the lying-in chamber nothing is more true than that pain is the mother's safety, its absence her destruction. Yet are those bold enough to administer the vapor at this critical juncture, forgetting it has been ordered that "in sorrow shall she bring forth."

In Philadelphia, on November 2, 1847, it was reported: "At the Pennsylvania Hospital in this city it has not been tried at all, being considered by the judicious surgeons of that institution as a remedy of doubtful safety or at least, as not sufficiently established to warrant them in its employment."

In the spring of 1846, Dr. Jackson began to renew his claim to the invention of the telegraph. In March, Morse wrote to his attorney, Edward Warren: "The most charitable construction of the Dr.'s conduct is to attribute it to a monomania, induced by excessive vanity." On October 29, Dr. Jackson called on Dr. John C. Warren and informed him that he, Jackson, was in fact the discoverer of etherization and that Morton had acted only as his agent in the matter. Although Warren now heard for the first time of Jackson's claim and expressed surprise at his statement, he invited Jackson to administer ether for an operation which he had planned for the second day following. This invitation Jackson declined and did not visit the hospital to see ether administered until November 21. Before he had ever seen ether used for an operation, on November 13, Jackson addressed a letter to M. Elie de Beaumont at Paris. He said:

> I request permission to communicate through you to the Academy of Sciences a discovery which I have made and which I believe important for the relief of suffering humanity as well as of great value to the surgical profession. Five or six years ago, I noticed the peculiar state of insensibility into which the nervous system is thrown by the inhalation of the vapor of pure sulphuric ether, which I respired abundantly, first by way of experiment, and afterwards when I had a severe catarrh, caused by the inhalation of chlorine gas. I have lately made a useful application of this fact by persuading a dentist of this city to administer the vapor of ether to his patients when about to undergo the operation of extracting teeth. It was observed that persons suffered no pain in this operation and that no inconvenience resulted from the administration of the vapor. I then requested this dentist to go to the Massachusetts General Hospital and administer the vapor of ether to a patient about to undergo a painful operation.

During the succeeding years, Jackson continued to press this claim.

In the little town of Jefferson, Georgia, 140 miles from the nearest railroad, Dr. Crawford W. Long first made use of the anesthetic power of sulphuric ether. He graduated from the University of Pennsylvania in the class of 1839 and soon after took up the practice of medicine in Jefferson. He early noted the effects produced by ether vapor and introduced the practice of inhaling ether as an exhilarant among the people of his home town and in the neighboring counties. In March, 1842, he administered ether to allay the pain of a surgical operation and continued this practice whenever occasion offered itself. In 1852, he moved to Athens, Ga. where he purchased a successful apothecary business. In 1852, he read a paper before the Georgia Medical and Surgical Association and in 1853, before the Medical Society of Georgia with the object of establishing "his claim to the priority of the discovery of the power of ether to produce anesthesia." Dr. Jackson's attention was attracted by Dr. Long's claim and in March, 1854, he made the lengthy journey to Athens and tried to induce Long to unite with him, Jackson to claim the discovery and Long to claim its first practical use in surgical operations, but Long indignantly refused this proposition. Jackson, foiled in this attempt, wrote to Senator Dawson of Georgia a statement that Dr. Long had undoubtedly used ether before any other claimant. This statement was reported to the Senate but came too late to influence the events which followed.

The Trustees of the Massachusetts General Hospital, in 1847, prepared a memorial addressed to Congress, praying that adequate compensation be paid to the discoverer of anesthesia. On receipt of a remonstrance from Dr. Jackson, this action was stopped and a committee was appointed to investigate his claim. This committee reported: "The whole agency of Dr. Jackson in the matter appears to consist only in his having made certain suggestions, which led or aided Dr. Morton to make the discovery—a discovery which had for some time been the object of his labors and researches." Dr. John Collins Warren testified: "I hereby declare and certify that I never heard of the use of sulphuric ether by inhalation, as a means of preventing the pain of surgical operations, until it was suggested to me by Dr. W. T. G. Morton in the latter part of October, 1846."

Applications made to Congress in 1849, in 1851, and in 1854 resulted in the introduction of a bill authorizing an appropriation of $100,000 for the discoverer of anesthesia. This bill, though favorably reported by Congressional Committees, was never passed. While Morton's applications were before Congress, Jackson was constantly present or represented in Washington, meeting every move with counter claims, attacking Morton's ability, his veracity, and his personal character.

Morton finally came to the end of his physical and financial resources. He attempted to resume his dental practice but found that he could work only a few hours a day. His physician, Dr. Homans, advised him to discontinue work and retire to his country home at West Needham. His dental equipment was sold. It was doubtful if he would be able to retain his home. Overwhelmed by persecution almost unparalleled in the annals of personal enmity, broken in health, financially ruined, he despaired of keeping together his devoted family.

The situation was intolerable and

was not allowed to continue. In 1856 and 1857, meetings of the medical profession were held in Boston which resulted in the formation of the Morton Testimonial Association. The movement was taken up in New York in 1858 and in Philadelphia in 1860. The Boston meetings were held at the homes of Dr. J. Mason Warren and Dr. Jacob Bigelow. New York meetings were held at the home of Dr. Willard Parker. In Philadelphia the meetings were held at the Hospital Building. The committees appointed at these meetings included many of the foremost medical names of the time. A national subscription was organized and carried through with such success that Morton's debts were paid and a sufficient sum left in trust to keep him in comfort for the rest of his life.

On the beautiful West Needham estate, saved from a sheriff's sale by the efforts of his friends, Morton, surrounded by his wife and children, carried on the life of a successful farmer. At the Norfolk County Fairs he took many prizes: "For the most valuable and economical improvements in the cultivation and management of the farm entire, for the finest cattle, for the best pair of farm horses, for the best dairy, for dairy products, for his geese, turkeys, fowl." The tax assessors records in the Needham Town Hall show that in 1864 he was taxed for "fifty three and a half acres of land, forty acres cultivated, with a dwelling, a cottage and two barns." Here Morton quietly continued his agricultural pursuits. He engaged in no controversy, made no claim.

The emergency of the Civil War for a time brought Morton from retirement. Stationed at Washington, he was ready to answer the call wherever a battle was in progress. He was with General Burnside at the Battle of Fredericksburg in December, 1862, and with Grant at the Battles in the Wilderness and at Spottsylvania Court House in May, 1864. At the army headquarters in the Wilderness, by order of General Grant, he was given an ambulance, tent, mess and servant. The Battle of Spottsylvania Court House was one of the bloodiest struggles of the war. Soldiers too seriously wounded to bear transportation to the base hospital at Fredericksburg were operated upon at the field hospitals. Making the rounds of these hospitals, Morton himself administered ether to over 2000 wounded soldiers. He described his experiences in a letter:

> Upon the arrival of a train of ambulances at a field hospital, the wounds are hastily examined, and those who can bear the journey are sent at once to Fredericksburg. The nature of the operation to be performed upon the others is then decided upon, and noted on a bit of paper pinned to the pillow or roll of blankets under each patient's head. When this had been done, I prepared the patients for the knife, producing perfect anaesthesia in an average time of three minutes, and the surgeons followed, performing their operations with dexterous skill, while the dressers in their turn bound up the stumps.

He concluded:

> For myself, I am repaid for the anxiety and often wretchedness which I have experienced since I first discovered and introduced the anaesthetic qualities of sulphuric ether, by the consciousness that I have been the instrument of averting pain from thousands and thousands of maimed and lacerated heroes, who have calmly rested in a state of anaesthesia while undergoing surgical operations,

> which would otherwise have given them intense torture. They are worthy of a nation's gratitude—happy am I to have alleviated their sufferings.

In 1847, Dr. Jackson was appointed by Congress, United States Geologist for the mineral lands in Michigan. He commenced the survey of these lands, but in June, 1849, resigned the position after an investigation of his work on complaints of drunkenness, inefficiency, and neglect of duty. He continued his private geological work and explored many mining properties. The reports of these surveys, with many papers on widely varied scientific subjects, make a list numbering hundreds of scientific titles published by Jackson between 1828 and 1873.

In June, 1868, one of the monthly magazines printed an anonymous article entitled "The Discovery of Etherization." It began:

> The discovery was made by Charles T. Jackson, M.D. of Boston, chemist, geologist, and State Assayer, who, after taking a medical degree in 1829, and spending three years in Europe in the pursuit of professional knowledge, commenced the practice of medicine and surgery in Boston in 1833. . . . Subsequently he repeated Davy's experiments with nitrous oxide, but with results no more satisfactory with respect to the safety and utility of its inhalation than those obtained by Davy himself. . . . When the first capital operation was performed, in which Dr. Jackson was requested both orally and by letter to administer the ether vapor, he was obliged, in fulfillment of a previous professional engagement, to be absent from New England. He, however, stated to Dr. Warren that he had fully instructed Dr. Morton how to administer it.

When this article was brought to Morton's attention, he became much agitated and decided that he must go to New York to arrange for a reply. At this time, a hot wave, which carried off many of the old and infirm, was sweeping over the Northern States. On his arrival in New York, Morton telegraphed for his wife to join him as he was not well. When Mrs. Morton reached New York, she found the doctor so much improved that they went for a drive in Central Park. There he became seriously ill and died while being taken to St. Luke's Hospital. At the hospital, the chief surgeon recognized Morton's body and said, turning to the physicians who were present, "Young gentlemen, you see before you a man who has done more for humanity and for the relief of suffering than any man who has ever lived."

On the monument erected in Mount Auburn Cemetery by the Morton Testimonial Association, is the inscription written by Dr. Jacob Bigelow:

> William T. G. Morton, Inventor and Revealer of Anaesthetic Inhalation. Born, August 9, 1819. Died, July 15, 1868. By whom pain in surgery was averted and annulled. Before whom in all time surgery was agony. Since whom Science has Control of Pain.

Horatio Hollis Hunnewell, for many years a resident of Wellesley, presented Morton's estate to the town. The extensive park, shaded by many fine old trees, with the sleepy brook, sheltered by shrubs and trees, still flowing under the old stone bridge, is an attractive place to visit. On the site of Morton's house is the building occupied by the Wellesley Public Library. A simple bronze tablet states:

"Here lived Dr. William T. G. Morton. He gave to the world the use of ether in surgery."

Morse lived to the age of eighty-one, wealthy and honored. Beside his attainment as a portrait painter and his invention of the telegraph, he was the first to use the Daguerreotype in America and was the first in the world to take portraits by this means. The Morse Code alone is a greater monument to his memory than any statue of stone.

Jackson was admitted to McLean Asylum, then situated in Somerville, Mass., in June, 1873 and remained there until his death, in 1880. Although he had a well-trained mind of exceptional brilliancy, he lacked the stability of character requisite for success in practice of medicine or in practical development of the discoveries which he was, in some degree, instrumental in making. When others brought these discoveries to a condition of practical usefulness, Jackson was afflicted with inordinate jealousy and fought unscrupulously to deprive them of the honor and financial reward which their long and effective labors merited. Morse's indomitable courage was sufficient to overcome these attacks and to ultimately win fame and fortune from the invention of the telegraph. In the case of surgical anesthesia, Jackson succeeded in preventing Morton, of a gentler disposition, from gaining recognition or reward, and brought him to an early and pathetic death.

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A GLIMPSE OF SEVENTEENTH CENTURY MEDICINE

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A "DEFENSE OF MEDICINE" by Antonio Francesco Bertini, professor of medicine, published at Lucca in 1699[1] offers an interesting view of conditions at the close of the seventeenth century and a retrospect over the preceding years. The work divides into two dialogues between Diego, a Spaniard, Bruno, a Frenchman, and Vincislaus or Wenzel, a German. Besides this commendable token of an international outlook on the part of its Italian author, the work aims at literary interest and adornment, and constantly quotes poetry. But its medical content is of more concern to us.

The seventeenth century is represented as a period during which the healing art had undergone many metamorphoses of opinions. A few years ago, we are told, physicians talked of nothing but ferments. Now they have relegated these to bakers and prate instead of mechanical architecture, animal economy, and the doctrine of configurations of Borelli.[2] The recent invention of the microscope has given rise to many doubts and conflicting views.[3]

Bertini recognizes, however, that there has been real progress. In addition to the discovery of the circulation of the blood and the anatomical discoveries of his age he indicates other advances. The chemical medicine of his century he considers as a step forward comparable to the introduction of the mariner's compass in navigation.[4] And despite what we have heard him say concerning ferments he accepts as an improvement in the theory of fevers the view that heat is not the essence but the effect of fever which is produced by fermentation of the blood,[5] a step towards the germ theory. He feels that his age has not merely banished many vain questions from medical doctrine, but has made notable discoveries as to the generation of diseases as well as in the structure of parts of the body. For example, it is now realized that it is anatomically impossible for catarrh to descend from the brain through the mouth to the lungs.[6]

Surgery for its part accomplishes feats which nature could not perform unaided. Tagliacozo of Bologna has rediscovered the way to regenerate the missing parts of lips and ears,[7] and Borri has invented a method of replacing the humor in the eye.[8] Wenzel praises the experiments of infusion and transfusion carried on with animals.[9]

Nevertheless Bertini still finds grounds for complaint. He takes vigorous exception to the fact that in some cities barbers act as surgeons, whereas surgeons should have undergone a long preparation and know anatomy and Latin.[10] Bertini further contends that the employment of a multitude of remedies does the patient more harm than good,[11] and that too many books are printed, confusing and burdening the mind more than they instruct it.[12]

Discussing modern medical literature, Bertini names three authors who have written many works but each of whom he believes will owe his future fame to a single book which will stand out above the others. These outstanding books are for Hieronymus Mercurialis his "De arte gymnastica,"[13] for Santorio his "De statica medicina,"[14] and for Prospero Alpini his "De medicina Aegyptiorum."[15] While modern anatomical discoveries have lessened men's respect for past medical authors, Bertini maintains that the works of Forest,[16] Benivenio,[17] Amato of Portugal,[18] Schenck,[19] Felix Plater,[20] and Ildano[21] will remain immortal, even though penned before the discovery of the circulation of the blood. Certain writers on anatomy before Harvey will also endure: Mondino, Carpi, Eustachius, Colombo, Giulio Casserio,[22] Acquapendente, Laurenzio,[23] and such surgical authors as Paré, Peccetti,[24] and Fallopio, especially since surgery has been less revolutionized than medicine by recent anatomy. The following writers of medical epistles will also last: Manardi,[25] Lange,[26] and Scolzio,[27] and the chemical works of Paracelsus, Libavius, Croll, and Helmont.[28] Elsewhere reference is made to Croll's doctrine of signatures and exterior architecture of plants.[29] Bertini does not, however, regard his own judgment as to which medical works will prove of enduring worth as infallible. He recognizes that posterity may reject some names esteemed in his day or restore others from neglect.

American and other foreign medicines play a considerable part in Bertini's book. The use of quinine has upset most theories of fevers.[30] We are told how the Americans cure dropsy.[31] Spon's "Observations sur les fièvres" is cited for other American remedies recounted to him by a German iatrochemist who, after ten years spent in the New World, was returning to his fatherland by way of Lyons.[32] The root ipecac is mentioned as a new American remedy for dysentery.[33] Hungarian fever is cured with sarsaparilla, while the most ardent fever is assuaged by use of simples of the Portuguese.[35] However, common herbs in our own gardens may be as efficacious as those imported from the Hesperides or New World, since it is unreasonable to doubt that Nature has provided the Old World too with suitable remedies.[36]

Bertini has ceased to believe in tyriac or theriac as an antidote for all poisons.[37] It is bad for cases of arsenic poisoning. But his conservatism is shown in speaking of the Copernican system as "justly condemned by the Sacred Congregation and rejected by many philosophers."[38]

References

1. Bertini, A. F., La medicina difesa delle calumnie degli uomini volgari e dalle opposizioni de dotti, divisa in due dialoghi. Lucca, 1699, 4.
2. *Ibid.*, p. 28. Joannes Alphonsus Borellus (1608–1680) combined mathematical and medical studies. Born at Castelnuovo near Naples, he studied mathematics at Rome with Castelli, a pupil of Galileo. In 1647 he distinguished himself as a physician at Messina in a violent epidemic. In 1656 he was called to the university of Pisa where in 1665 he became ordinary professor of mathematics. While in Tuscany as a result of much dissecting he composed his "De motu animalium" which, however, was first printed posthumously at Rome in 1680 in two volumes by the press of Angeli Bernabò. Borelli also investigated the digestive apparatus and capillarity, described the rings of Saturn, an eruption of Aetna, an epidemic at Pisa, and, like most of his contemporaries, composed verses. In 1667, as a result of quarrels at Pisa but alleging ill health, he returned to

Messina where he became involved in political difficulties and fled to Rome. There he found a protectress in Queen Christina from Sweden but had to teach elementary mathematics to keep from starving and died miserably. Among the works printed during his lifetime were: "Euclides restitutus sive prisca geometria," Pisa, 1658; "De vi percussionis," Bologna, 1667; "Historia et meteorologia incendii Aethnaei anno 1669. Accedit responsio ad censuras Honorati Fabri contra librum auctoris de vi percussionis," Reggio, 1670; "De motionibus naturalibus a gravitate pendentibus," Reggio, 1670.

3. Bertini. *Op. cit.*, pp. 47–49.
4. *Ibid.*, pp. 349–350.
5. *Ibid.*, p. 316.
6. *Ibid.*, p. 245.
7. Such facial surgery had been invented in the fifteenth century by Branca of Sicily: see my "Science and Thought in the Fifteenth Century," N. Y., Columbia Univ. Press, 1929, pp. 22–23. To the references given there may be added: Zwinger, Theodor, Theatrum vitae humanae, 1604, p. 1242; and Inventionum sylva, 1626, cap. xi. Both works use the same words: "Branca Siculus Cataneus chirurgus ac physicus eximius suo ingenio et arte aures nasos et labra quibus caesa fuerant instaurabat. Huius discipulus fuit Balthasar (Baltazar) Pavonus Siculus." Rhinoplasty is also discussed in the fifteenth century work of Heinrich von Pfolspeundt, ed. H. Haeser und A. Middeldorpf, Berlin, 1860.
8. Bertini. *Op. cit.*, p. 167.
9. *Ibid.*, p. 248: "Medicina Infusoria et Transfusoria invenzione maraviglievole de' nostri tempi ha accresciuto pregio all' Arte. . . . hanno trovata la Medicini Infusoria e Trasfusoria con infondere nelle lor vene vari velenosi liquori a solo fine di osservare quali offese cagionino al sangue or troppo incagliandolo or troppo sciogliendolo: ed all' incontro infondendo ne' loro vasi sughi acque e spiriti medicinali hanno osservato quali possano ritornar' il sangue incagliato alle sua naturale fluidità e quali quando e' sia troppo sciolto restituirlo al suo primiero unimento. Trasfondendo poi dalle vene de' giovani Animali nelle vene de' vecchi il sangue a fine di ringiovanirili."
10. *Ibid.*, p. 161.
11. *Ibid.*, p. 288.
12. *Ibid.*, p. 258.
13. *Ibid.*, p. 72. Girolamo Mercuriale (1530–1606) of Forlì practiced medicine at Padua and is said to have left a large fortune. The "De arte gymnastica libri sex" was printed at Venice in 1569, 1573, 1602; Amsterdam, 1672; etc.
14. Concerning Sanctorius, a professor at Padua, see Singer, C. A Short History of Medicine, 1928, pp. 108–109.
15. Alpini (1553–1617) was a botanist as well as physician and his "De plantis exoticis," published posthumously in 1627, is sometimes called his principal work.
16. Petrus Forestus or van Foreest (1522–1597) took his medical degree at Bologna and practiced at Bourges, Alkmaar and Delft. His works were frequently printed through the seventeenth century.
17. Antonio Benivieni (*c.* 1440–1502), born at Florence, is regarded by Gurlt, Geschichte der Chirurgie, 1898, 1: 905–909, as one of the founders of pathological anatomy. Some two hundred autopsies are given with his "De abditis nonnullis et mirandis morborum et sanationum causis," printed at Florence, 1506, 1507; Venice, 1516; Naples, 1519; Paris, 1528; Basel, 1529; etc. It discusses syphilis, gallstones, appendicitis, and heart disease.
18. Amatus Lusitanus or Johannes Rodericus Castelli Albi (i.e. Castelblanco, his birthplace in Portugal) flourished in the middle of the sixteenth century and became involved in a controversy with Matthioli. His chief works are "Centuries" of medicinal cures and commentaries on Dioscorides.
19. Johann Schenck (1530–1598) took his medical degree at Tübingen, practiced at Strasburg, and became municipal physician at Freiburg.
20. Felix Plater (1536–1614) studied at Montpellier and Basel where he became municipal physician. He wrote various medical works.
21. Fabricius Hildanus or Wilhelm Hildenius (1560–1634) seems meant.

22. Julius Casserius (*c.* 1562–1622) of Piacenza taught at Padua. His "De visus auditusque organis historia anatomica" was published in folio at Ferrara, 1600, and other anatomical works in the years following.
23. Andreas du Laurens, physician to Henry IV of France, died in 1609. He was born at Arles, studied at Paris, took his degree at Avignon, and practiced at Montpellier. The other anatomists listed are too well known to require identification.
24. Peccettius, Franciscus, Chirurgia . . . in qua omnia tam ad huius artis theoriam quam praxim spectantia traduntur et explicantur. Florence, 1616. The author was a physician of Cordova.
25. The first of the numerous editions of the "Medicinal Epistles" of Giovanni Manardi (1462–1536) who was physician to king Ladislaus of Hungary and then taught at Ferrara was at Ferrara in 1521: "Epistolae medicinales in quibus multa recentiorum errata et antiquiorum decreta reservantur."
26. Johannes Lange (1485–1565), born in Silesia, took his degree at Pisa in 1521 and became physician to the elector palatine. His medical epistles were printed at Basel in 1554 and a number of times thereafter.
27. Otherwise Laur. Scholtze a Rosenau (1552–1599). His "Epistolarum philosophicarum medicinalium ac chymicarum . . . volumen" was printed at Frankfurt, 1598; Hanover, 1610.
28. BERTINI. *Op. cit.*, pp. 73–74.
29. *Ibid.*, p. 272.
30. *Ibid.*, pp. 110, 113–114.
31. *Ibid.*, p. 194.
32. *Ibid.*, p. 170.
33. *Ibid.*, p. 317.
34. *Ibid.*, p. 215.
35. *Ibid.*, p. 277.
36. *Ibid.*, pp. 271–272.
37. *Ibid.*, p. 273.
38. *Ibid.*, p. 201.

[From Boyle: Opera Omnia, Venetiis, 1697.]

"THAT REMARKABLE PHILOSOPHER AND PHYSICIAN, WELLS OF CHARLESTON"[*]

THE FIRST EXPONENT OF THE THEORY OF NATURAL SELECTION, DISCOVERER OF THE NATURE OF DEW, AND PHYSICIAN[†]

By FRANK LESTER PLEADWELL, CAPTAIN, M. C., U. S. N. (RET.)

HONOLULU, T. H.

MY interest in the subject of this paper dates from a conversation with the late Sir William Osler, at that open house of hospitality, No. 13 Norham Gardens, Oxford, on Saturday evening, May 20, 1916. After dinner as we sat on the terrace throughout the long twilight characteristic of the verge of summer in that latitude, Sir William touched on a wide range of topics, but finally the talk led to the subject of medical biography. Venturing to express how much I had enjoyed his "Alabama Student" and the papers in "Aequanimitas," I voiced the hope that he would give us additions to the sketches contained in the former volume, after the war. He responded by saying that there were a number of medical men whose careers he thought were rather inadequately presented in existing biographies.

He instanced Thomas Lovell Beddoes, that strange poet-physician, in whom he seemed to have a special interest. Beddoes was the son of a doctor, Thomas Beddoes, founder of the Pneumatic Institute for the treatment of diseases by inhalation and author of a treatise on pulmonary consumption. It was the latter's assistant, Humphry Davy, who discovered the anesthetic properties of nitrous oxide; Sir William then went on to mention two more individuals whom he thought worthy of more extended biographical treatment; one was Benjamin Rush[‡] and the other William Charles Wells, whom he referred to as "that remarkable philosopher and physician, Wells of Charleston." Beddoes was known to me then only as the author of that charming bit of poetry, the song in "Torrismond," which runs as follows:

How many times do I love thee, dear?
Tell me how many thoughts there be
In the atmosphere
Of a new-fall'n year,
Whose white and sable hours appear
The latest flake of eternity:
So many times do I love thee, dear.

How many times do I love again?
Tell me how many beads there are
In a silver chain
Of evening rain,
Unravelled from the tumbling main,
And threading the eye of a yellow star:
So many times do I love again.

Of Benjamin Rush I had some knowledge, but of Dr. Wells I had to admit a profound ignorance. "Well," said Sir William, "he is the man for you to write up." Thus the seed was planted, but it did not begin to germinate until, several years later, I ran across an interesting and enthusiastic reference to Wells in a pamphlet by Dr. Elisha Bartlett, the subject of the pamphlet being "An Address to the Louisville Medical Society," December 7, 1849. The reference to Dr. Wells in the address occurs in connection with an enunciation of views by Dr. Bartlett which should find a responsive echo in the hearts of all who are interested in the history of medicine, and who appreciate the cultural value to a physician of the study of such history. He said:

[‡] A definitive Life of Rush is being written by Mr. Nathan G. Goodman of Philadelphia.

[*] Aequanimitas. Some Aspects of American Medical Biography. By William Osler. Ed. 2, 1906, p. 324.

[†] Read before the Medical History Club of Honolulu.

> In the Introductory Address to the Medical Class, which I had the pleasure of making a few weeks ago, I took occasion to speak of the pleasures and the benefits which the practical physician might derive from the cultivation of studies and tastes not immediately and exclusively connected with his own occupation. I expressed the opinion that a reasonable devotion to these studies, and a reasonable indulgence in these tastes, would not only improve the character and augment the sum of his happiness, by calling into exercise the finest and noblest powers of his mind, but that he might also thereby be rendered a more useful and accomplished practitioner of his art; that he might thus be made, not only a wiser and a better man, but a more skilful physician. Amongst the studies which I then particularly enumerated, and nearest allied of them all to his practical duties, was the history and the literature of his own science and art; and so much especially of this history and literature as is contained in the written lives of the most distinguished cultivators of medical science. I do not know any more agreeable study than that of biography; and although the annals of our own science, when compared with those of politics, general literature, belles-lettres, and the arts, cannot be said to be rich in this species of composition, they are still sufficiently so to furnish a fertile source of instruction and delight. I propose to occupy the time which you have assigned to me on the present occasion, with a short history of the life and the labors, and with such a delineation and estimate of the character, as the study of this life and these labors will enable me to make, of an individual, less known, I am sure, than he deserves to be, especially to American physicians: I mean William Charles Wells. And I take up this subject, not as a piece of irksome drudgery, but as a labor of love. I had just finished reading, when I prepared this sketch, for the first time, the volume which contains the record of his life and the results of his labors; and my mind had been so interested and my feelings so warmed by its perusal, that the business before me became a pleasure, and not a task. I cannot doubt that I shall awaken in your bosoms emotions and sentiments corresponding in some degree to those which have been kindled in mine.*

Elisha Bartlett's enthusiasm served to revive my interest in Wells, and I undertook to collect what information was available in this country and in England, and weave it into a connected story. First in importance as source material is his own memoir contained in the volume of his selected works published posthumously in 1818.† There is a biographical sketch of Dr. Wells in the "Dictionary of National Biography," probably written by the late Dr. Norman Moore, and a less well-known account in Munk's "Roll" of the Royal College of Physicians, London. Arnold Chaplin, in his Fitzpatrick Lectures on Medical History at the Royal College of Physicians, 1917–1918, made some valuable references to Wells, and these are incorporated in his "Medicine in England During the Reign of George III," published personally by the author in 1919. I can lay claim to have discovered very little that is new and unpublished about Wells, but an uncollected letter was traced to *The South Carolina Historical and Genealogical Magazine*,* an unpublished letter was found in the George Chalmers correspondence in the British Museum,† and finally I have a very interesting unpublished letter in my own collection.

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* Elisha Bartlett (1804–1855) belonged to that class of peripatetic medical professors, who made a marked impress, by their ability and personality, on American medicine. Nathan Smith was another of this class. The sketch of Bartlett in Kelly and Burrage's "Medical Biographies" was written by Sir William Osler.

† The full title is: /Two Essays:/one/Upon Single Vision with Two Eyes;/the other/ On Dew./ A Letter/to the/Right Hon. Lloyd, Lord Kenyon./ and/ An Account/ of / A Female of the White Race of Mankind,/Part of Whose Skin Resembles that of a Negro;/ with/Some Observations on the Causes of the

William Charles Wells was the second son (the fourth child) of Robert and Mary Wells, natives of Scotland, who had migrated to America in 1753, settling in Charleston, South Carolina, where William was born on May 24, 1757. The father was first engaged in some mercantile business, but this failing he resumed his former occupation of bookseller and bookbinder, to which he added later the publishing of a newspaper. He was well educated, a Latin scholar, well read, and prosperous until the war disrupted his business. The family was loyal to the British king, and would have nothing to do with the independence movement, and, fearing lest his favorite son William might become contaminated by the "rebels," he required him to wear a tartan coat and a blue Scotch bonnet, so that he would not forget that he was a Scotchman at heart, and not an American. In 1768 William went to Dumfries, Scotland, and attended a grammar-school there for two and a half years, after which he entered the "lower classes" of Edinburgh University, remaining for two years. He also took lessons in drawing, and met in the drawing class two individuals, David Hume and William Miller, who were to become his lifelong friends. In the summer of 1771 young Wells returned to Charleston, and became an apprentice to Dr. Alexander Garden, the chief practitioner of the place. Dr. Garden devoted a considerable portion of his time to botany and zoology, on which subjects he actively corresponded with John Bartram, Peter Collinson, Gronovius, John Ellis, and Linnaeus. His name is perpetuated in the genus *Gardenia*. Young Wells' association with Dr. Garden terminated in 1775 at the outbreak of the War of Independence. He then went to London, where his father had preceded him, and shortly matriculated for medical courses at the Edinburgh University. Father and son had both left America because of their steadfast adherence to loyalist principles. Dr. Garden, an uncle, and his elder brother had all resisted the young man's design to leave the

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Differences in/Colour and Form between the White and Negro/Races of Men./ By the Late William Charles Wells,/M.D. F.R.S. L. & E./ With/ A Memoir of his Life,/ Written by Himself./ London;/ Printed for Archibald Constable and Co. Edinburgh,/ and Longman, Hurst, Rees, Orme, and Brown, London./ 1818./

"An Essay on Dew, and Several Appearances Connected With It," reprinted from the above, was published in Philadelphia in 1838.

* Published at Charleston, S. C. (XXVI, I, Jan. 1925).

† B. M. 22900, folios 240–243.

country, but his mother supported him, and when he was importuned to sign a paper which he considered disloyal to the king, he was shipped to London, where he was most kindly received by his father, who approved his conduct. Wells passed his preliminary examinations in medicine in 1778, and in the autumn of that year returned to London. During his stay in Edinburgh he renewed his acquaintance with Hume and Miller, and gained a third friend in Dr. Robertson Barclay. In London he took instruction in practical anatomy, and attended the course of lectures on anatomy and midwifery given by Dr. William Hunter. He spent three months as a surgeon's pupil at St. Bartholomew's Hospital, apparently to fit himself for the duties of surgeon to a Scotch regiment then serving in Holland. This position proved to be an unfortunate one owing to difficulties with a Colonel Hamilton of the regiment, and he resigned. He then went to Leyden for three months, and presented a thesis entitled "De Frigore" (On Cold), which in his memoir he calls "a paltry affair," and having no special excellence except that the Latin in which it was composed was altogether his own. It is of interest to note that he entered himself in the matriculation album of the University of Leyden, under date of February 23, 1780, as hailing from Charleston. He now returned to Edinburgh and on June 24, 1780, received his degree in medicine. It was at this period, while in London, that he formed his fourth friendship, this one with Dr. William Lister.

In the autumn of 1780 Dr. Wells was asked by his father to return to Charleston and endeavor to protect his business interests there, which were in bad shape owing to the war and due to mismanagement on the part of the elder son. With the idea of effecting a reconciliation between this son and the father Dr. Wells persuaded the former to go to London, offering to remain in Charleston in charge of the business until the brother could return. As a consequence the newly made doctor of medicine abandoned his profession for the time being and became a printer, bookseller, merchant, and agent. One of the uncollected letters previously mentioned belongs to this period and is of sufficient interest I think to quote in full at this point. It was presented to the South Carolina Historical Society by Mr. Sidney Turner of London, and is addressed to Dr. James Currie. Dr. Currie is perhaps best known as an early biographer of the poet Robert Burns, but he deserves laurels in the medical field also, for he was the first to use cold baths in typhoid, checking the results with the clinical thermometer. Dr. Benjamin Rush was a friend and correspondent of Dr. Currie. The letter follows:

Charlestown, March 18, 1781.

My dear Currie:

My last letter to you was dated at London about four months ago. This is written in Charlestown. In such an interval of time, and after so considerable a change in geographical situation, many things must have occurred which as a friend you will readily desire to know concerning me. You shall be gratified, in part at least, and I shall discharge a duty which becomes the harder the longer its performance is delayed. I left London about the middle of November last, and with some difficulty arising from want of stage-coaches on the road, and my wish to avoid the expense of travelling alone in a portchaise, I arrived at Falmouth a few days before the packet sailed, which happened on the 22nd of November, and a favourable wind carried us to the island of Madeira in ten days; there we left a mail, and after a stay of not more than 36 hours, we again put to sea. The rest of our passage was perfectly uninterrupted, and we arrived at Charlestown on the 12th of January.

As far as *pleasant* can be predicated of any passage, I think it may be ours. The weather was uniformly good, the air temperate; the vessel, roomy, light, and quick sailing; the stores excellent, and the company such as I shall not readily meet with again on shipboard; the captain of the packet a good-natured, plain man, and bore honourable scars in his front, marks of his having more than once defeated the Rebels in their attempts to take his vessel.

There was a monstrous man with respect to size on board, who was rated as Surgeon, but whose chief employment was to provide us with good victuals and drink; this he faithfully performed, partly from an interested motive, as he himself was affected by every culinary misfortune. This was not the sole manner of his being serviceable; he was placed at the foot of the table, which he entirely filled, and gave a loud laugh to every good thing that was said.

My fellow passengers were only two, Major Ross and Captain Broderick, both of them Aide de Camps to my Lord Cornwallis. The latter was a young man and had a good deal of English reserve, which could scarcely be distinguished from haughtiness; he was however decently informed on some subjects, and formed no contemptible member of our party. But the person to whom I ascribe almost every circumstance which rendered the passage agreeable was Major Ross. The major was born in the north of Scotland, and finished his classical education at the University of Aberdeen, by taking the degree of Master of Arts at so early an age as fifteen. Since that time he has continually been in the Army, and much in the world. The general tenor of his studies seems to have been to render himself a complete soldier. In this pursuit he has attained a considerable degree of knowledge of every branch of learning or science which is in any way connected with the military art. In acquiring these things he has not neglected even what many do who are engaged in as active professions, the dead languages. His address is easy, his manner polite, and his attention to the most minute things in the way of making everyone pleased, is greater than that of any other person of my acquaintance. In short he is the most *finished gentleman* that I ever knew. Such is the character of the person to whose company and conversation I ascribe in a particular manner the pleasantness of the passage.

I found my brother here in good health, and an officer in a company of militia, clothed in uniform and well disciplined, consequently a good loyalist.

My father's affairs, to settle which was the sole object of my expedition, are in a better situation than I expected to find them in. The books during the Rebellion have been most shabbily kept; but then few of the accounts have been settled by that vile and beggarly attempt to represent the value of things, the American paper currency. I am now totally occupied in putting everything in order, indeed that is the only thing which I can yet do, as no suits are allowed to be carried on to recover debts contracted before the surrender of the Arms; and you know how difficult it is to obtain payments from Americans without threatening them at least with scourge of the law.

I have read nothing since I have been here, and thought nearly as little. My mind is filled with nothing but what relates to my father's business. He has been appointed King's Printer in this Province, and it has taken up a good deal of my time to render his appointment of effect. A newspaper is now printed by my brother under the [title ?] of *The Royal Gazette,* by R. Wells and Son; and I am confident if things remain quiet here the appointment will be attended with considerable emoluments.

I do nothing in a medical way, but you may direct to me as Dr. Compliments to Bell and desire him to remember me to Mr. Skinner and Miss Alder. I shall write him soon.

My next to you will contain a whole budget of politics.

Yours sincerely
Will. Chas. Wells

Dr. James Currie, Physician
No. 17 Church Street
To the care of Mr. Edward Currie
Merchant, Liverpool.

The congenial fellow-voyager of Dr. Wells was Alexander Ross, who served in the British forces in America throughout the war, and was one of the commissioners appointed by Lord Cornwallis to arrange the details of the surrender of the British forces at Yorktown. At this time he was returning to America after having delivered dispatches about the Battle of Camden, fought on August 16, 1780, perhaps the worst defeat ever inflicted on an American force. But the British occupation of Charleston was now drawing to a close, due to the pressure exerted by the American victories of King's Mountain, Cowpens, and Guilford, and in the autumn of 1782, the city of Charleston was evacuated by the British. In December, 1782, Dr. Wells embarked for St. Augustine, Florida, carrying with him as much movable property as he could, amongst other things his father's printing press and printers' types. Respecting this press, he says:

> When I arrived in St. Augustine, I determined to put up the press there, and print a newspaper. But here a considerable difficulty arose; the press had been easily taken to pieces in Charleston, and I naturally thought that it might be readily put together again; more especially as I had brought with me a regular pressman; but to my surprise he told me that he knew nothing of the matter; that he could work a press as well as any person, when it was put together, but that the putting it together constituted the particular business of a press-joiner. In this dilemma I recollected that there was amongst my brother's books one entitled "The Printer's Grammar," containing rude cuts of a printer's press. I studied this book for several days with the greatest diligence, and at length by means of the information derived from it, and with the assistance of a common negro carpenter, completely succeeded in my attempt to put the press in working order.

Besides being a printer, bookseller, merchant, trustee, acting as judge-advocate in a court-martial, as officer in a company of volunteers, when he reached Florida, in addition he managed a theatrical company, and even took parts himself, acting in a character which he had seen David Garrick present some seventeen years before, that of Lusignan in Zara. Dr. Wells seems to have been a most versatile person. After the preliminaries of peace were signed, at the urgent request of his father, he returned to Charleston under a flag of truce; but this did not protect him from being arrested upon a private suit growing out of one of his brother's transactions. He refused bail and spent three months in prison before matters were adjusted, and he was able to sail for St. Augustine. His ship on leaving Charleston grounded on the bar and he barely escaped death from drowning. In a few months his brother returned from England and relieved him of the charge of the father's affairs. He sailed for England in May, 1784. In referring to this period spent in America, in the memoir, he says:

> I completely gave up all study, not even reading the pamphlets and magazines sent me by my father. I have already said in what manner much of my time had been employed; I shall now add that another portion of it was spent in female society, which I had formerly much neglected.

Upon his return to London Dr. Wells began to think seriously of practicing his profession, and also to cultivate the society of medical men. He became acquainted with Dr. Matthew Baillie, a celebrated physician of this day, nephew of William and John Hunter, the last inheritor of the "Gold-headed Cane," and from the lucidity of his medical observations entitled to be called the Morgagni of the English school of medicine. With Dr. Baillie the young physician contracted the fifth intimate friendship of his career, which he states in the memoir was the last he formed.

In the Spring of 1785 Wells spent three months in Paris, engaged chiefly in sightseeing. Returning to London in midsummer he took lodgings, and in the autumn hung out his name upon the door as "Dr. Wells." In order to launch himself professionally he was obliged to borrow £130 from a friend, his father being unable to help him. Where he lived in London at this time is not clearly shown, but in 1794 he was at Salisbury Square, Fleet Street, subsequently at Serjeant's Inn, Fleet Street, where he lived until the end. According to Munk Dr. Wells was "a shrewd and observing physician, a cautious reasoner, with few equals and no superiors," but from the point of view of income from practice he was far from being a success. In his memoir he discusses this aspect of his affairs with great frankness. He passed several years without taking a single fee, and was ten years in practice before his income, his only source of revenue, reached the equivalent of a thousand dollars a year. To make up the deficiency he was obliged to make frequent loans from friends, until the total indebtedness was £600. By exercising the most rigid economy he was able in his last years to pay off this debt, and when he died he left £350 in his desk, for he never used a bank or made investments. His own comments upon the sparseness of his income were as follows:

> The smallness of these receipts will perhaps appear the more extraordinary, when I say that during a great part of this time Dr. Pitcairn, and during the whole of it, Dr. Baillie often sent patients to me, and made every exertion to promote my interests. But I lived at a considerable distance from them, and was unable, from want of a carriage, and from various other circumstances, to appear properly as their representative.

I do not know what Dr. Wells referred to when he mentioned "various other circumstances" as standing in bar of his appearing properly as the representative of Doctors Pitcairn and Baillie, but it is possible that he himself appreciated that he possessed certain ineradicable traits of temperament unfitting him for success in the general practice of medicine. When a youth he admits that he was irritable, passionate, and violent of temper, but asserts that in the last twenty years of his life he acquired the faculty of control over this tendency, and instanced as proof of this that he never had the smallest difference with any one of his five intimate friends. Living in a period when it was not thought unusual for professional men to drink to excess he seems to have been particularly abstemious in this respect, following the example of his father. When in Florida in 1782 he became president of a club where once a week there was a meeting at which he states it was thought necessary to become intoxicated, but the other six days of the week he drank nothing but water. Dr. Wells admits that he was addicted to the practice of swearing, and blames this habit on his early associations in Charleston. He says:

> I lived till I was near eleven years old close upon the harbour of a large seaport in America, and by this means associated much with black-guard sailor boys. To this I attribute a practice of swearing of which I have from the time of being a child been frequently guilty when my feelings have been agitated, and even sometimes when no excuse of this kind existed. . . .
>
> As I fancy that several parts of my character, from various reasons, have been a good deal misunderstood, even by my most intimate friends, I shall relate here, with little regard to method or connection, some circumstances which may tend to illustrate it. I began to show, even in my earliest childhood an invincible firmness of mind. When my father, who was a passionate man, beat me for a fault which I was conscious I had committed, I used to entreat mercy most piteously; but if I believed that I was in the right, the utmost punishment he could inflict would scarcely ever force a tear from me.

On March 17, 1788 Wells was admitted a licentiate of the Royal College, and on the 3rd of September, 1789, he was elected Physician to the Finsbury Dispensary, an office which he held until December 11, 1799. This appointment gave him the means of studying medicine practically, and he received from the institution a gratuity of £50, which was not unwelcome. In November, 1795 he was elected assistant physician to St. Thomas's Hospital, promoted in 1800 to physician. In November, 1793, he was admitted into the Royal Society, and in 1814 into that of Edinburgh. The former honor came probably as the result of the publication in 1792 of his highly original "Essay on Vision." A reference in this essay to the subject of giddiness was attacked by Dr. Erasmus Darwin in his "Zoonomia," and Dr. Wells answered him in two letters published in the *Gentleman's Magazine* for September and October, 1794. In the latter year he took up cudgels in defence of his friend Dr. James Currie, by addressing a long letter of complaint to George Chalmers, the historian, who had just re-printed his book "An Estimate of the Comparative Strength of Britain," &c., with a dedication to Dr. Currie attributing to him principles of republicanism and the authorship of a certain pamphlet, which Dr. Currie entirely disowned. This correspondence is in the British Museum (22900, folios 243–252) and is much too long to quote here, but is of value in estimating the character of Dr. Wells, and exhibits his intense loyalty to a friend. In 1795 Wells published in *Philosophical Transactions* his paper on Galvani's experiments, and in 1797 "Experiments on the Colour of the Blood." In 1811 he expanded his "Experiments and Observations on Vision," and published them in the same journal. With the exception of his "Essay on Dew" which was not published until 1814, the foregoing are his principal contributions in the field of natural philosophy. But in medicine he was not idle, and at least two papers containing original observations of great value were produced by him in this period. Dr. Arnold Chaplain, in his "Medicine in England During the Reign of George III" (1919), has this to say regarding Dr. Wells' mark in medicine:

> The medical work of Wells has not, perhaps, received the consideration it deserves, but a study of it will confirm the opinion that he was a highly original physician. His chief claim to distinction in this sphere rests on the papers he communicated to the Society for the Improvement of Medical and Chirurgical Knowledge, in which he dealt with the occurrence of albumen in cases of dropsy. His first paper, read on November 4th, 1806, related only to cases of dropsy following scarlet fever. This phenomenon had been observed by Plenck, of Vienna, Cruikshank, and Berserius long before, but it was Wells who noticed that blood and albumen were present in the urine in these cases. He also established the fact that the dropsy occurred in the upper parts of the body, and described, without however giving them a name, the uraemic seizures to which such cases are liable. . . . On June 4th, 1811, he read another paper before the same society, which is marked by his accustomed care and skill in scientific investigation. Here he pointed out that albumen was to be found in cases of dropsy other than scarletinal, and drew a distinction between hydrothorax, ascites, and dropsy of the skin, in that the two former, if primary, did not have albumen in the urine. This was the first attempt to differentiate between the various forms of dropsy.*

Furthermore, it should not be overlooked that Dr. Wells, in 1810, had published perhaps the earliest clinical report on the cardiac complications of rheumatism.* I have appended a list of titles of Wells' other medical communications, which number fourteen in all, at the end of this paper.

Without question Wells' major achievement in natural philosophy was his work on the nature of dew. For this work he was awarded the Rumford medal of the Royal Society in 1814. I quote again from Dr. Chaplin:

> These experiments were carried out in the garden of Mr. James Dunsmure, the merchant friend of Wells, who lived in Surrey, three miles from Blackfriar's Bridge. . . . To this house Wells betook himself late in the afternoons, and, with varying intervals, caused by ill-health, prosecuted his experimental work during the nights, returning in the early morning to his house for the day's work. In his published "Essay on Dew" he pays an affectionate tribute to his friend Dunsmure for allowing him to use his garden "at considerable inconvenience to the members of the family." Wells also conducted experiments in Lincoln's Inn Fields when increasing infirmity rendered it impossible for him to go into the country. . . . Such was the work of Wells. It is a melancholy picture, this last effort of his, feverishly labouring to finish his experiments, with water-logged legs, and the agony of cardiac asthma ever present; spending nights in Dunsmure's garden which should have been devoted to repose, and then hurrying back to Town in the early morning to write down his results lest death should

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* On the Presence of the Red Matter and Serum of the Blood in the Urine of Dropsy, which has not originated in Scarlet Fever. *Trans. Soc. Promotion of Med. & Chir. Knowledge, London*, 1804–12. 3: 194–240.

* On Rheumatism of the Heart. *Ibid.*, 3: 372–412.

claim him ere his work was completed. Surely few scientific workers have battled so bravely with adverse conditions.

Dr. Wells' scientific researches on dew constitute the foundation stone of the modern science of ventilation, particularly in its relation to relative humidity and the influence of the latter quality on the comfort and health of the occupants of the theater, the barrack, the ship and the factory.

Among the collected papers by Dr. Wells which were included in the volume containing the memoir, published in 1818, at the end of the "Letter to Lord Kenyon," appears an "Account of a Female of the White Race of Mankind, part of whose skin resembles that of a Negro," &c. At the end of this paper the passage occurs in which Wells anticipated Charles Darwin in recognizing the principle of natural selection. In October, 1865, Darwin, in a letter to Sir J. D. Hooker, says:

> Talking of the "Origin" [of Species, by Means of Natural Selection, published in 1859] a Yankee called my attention to a paper attached to Dr. Wells' famous "Essay on Dew," which was read in 1813 to the Royal Society, but not (then) printed, in which he applies most distinctly the principle of Natural Selection to the Races of Man. So poor old Patrick Matthews* is not the first, and he cannot, or ought not any longer to put on his title-page "Discoverer of the Principle of Natural Selection."†

In speaking of Dr. Wells' cultural attainments, Dr. Chaplin states:

> Wells was an excellent classic, and wrote Latin with ease and correctness. In the literature of his own tongue he was widely read, and as a writer of vigorous and even elegant English it may be doubted whether he had a superior in the medical profession. [His autobiography] is worthy of perusal as an honest and fearless estimation of his character and work. Altogether, Wells was one of the great men of our profession during the reign of George III; a man of great scientific ability, with a lofty conception of duty, and with an adherence to truth which never swerved.

As we have noted previously Wells became a licentiate of the Royal College of Physicians of London in 1788, but he was never admitted as a Fellow. There had long been a controversy over the decision of the College to admit to its fellowship only those candidates who came from either Oxford or Cambridge. The examination for the fellowship was no more exacting than that for becoming a licentiate, but the College stood on its rights, and in spite of appeals to law, it was many years before it became liberalized in this matter. In 1797 Dr. Wells determined to put the matter to a test in his own case, and was proposed by Dr. Pitcairn and seconded by Dr. Baillie for the examination. The College refused the request, and refused again later. Thus, as Dr. Chaplin remarks:

> William Charles Wells, Fellow of the Royal Society, Physician to St. Thomas's, and author of the Essay on Dew, failed to become a Fellow of the College. His "Letter to Lord Kenyon," dealing with this episode, on account of its manliness, its spirit, its cogent reasoning, and its

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* Patrick Matthews was the author of "Naval Timber and Arboriculture" (1831) in which he claimed to have anticipated Darwin in discovering the principle of natural selection. (*Gardener's Chronicle*, April 7, 1860.)

† Darwin, F. Life and Letters of Charles Darwin. N. Y., 1888, 2: 225.

literary charm, should be read almost as a model of what such specimens of composition should be. A few years later the President caused Dr. Wells (through Dr. Baillie) to be asked if he still had any desire to become a Fellow, but to this he dryly remarked that he had none.

In 1800, when Dr. Wells was forty-three years old, he was seized with a slight fit of apoplexy, which incapacitated him for several months. He put himself on a very strict limitation of diet, and remained comparatively well until 1813, when he became quite infirm from general weakness associated with shortness of breath and swelling of his ankles. His friend Dr. Lister strongly urged him to remain quiet, but he could not resist the prosecution of his experiments and only consented to desist from them when he was attacked with palpitation. He improved in health until the beginning of the year 1817. In his account of his own illness he speaks of a symptom at this time which is suggestive of the condition which a year later was to be described by John Cheyne of Dublin, and known to the medical world somewhat later as Cheyne-Stokes respiration. Dr. Wells reference is as follows: "In the beginning of the present year [1817], I observed that I frequently, as by an involuntary act, made a sudden and deep inspiration."

From early in the year 1817 Dr. Wells looked forward to a fatal termination of his disease, and proceeded to arrange his affairs with great exactness. From about the 6th of August his physicians, Dr. Lister and Dr. Baillie, as well as himself, abandoned all hopes of recovery, and he died in his quarters in Serjeant's Inn on the evening of September 18th. He had requested that he be buried at St. Bride's Church, near the remains of his mother and father, and soon after his burial one of his sisters erected a tablet to his memory, reading:

NEAR THIS PLACE ARE DEPOSITED THE
REMAINS OF
WILLIAM CHARLES WELLS, M.D.,
F.R.S., L. & E.
WHO WAS BORN MAY 24, 1757
AND WHO DIED SEPTEMBER 18, 1817.
A SKILFUL AND LEARNED PHYSICIAN, AN
INVENTIVE PHILOSOPHER,
A MAN OF SINGULAR WORTH AND HONOUR,
HE EXTENDED THE BOUNDARIES OF NATURAL SCIENCE,
AND EXHIBITED IN HIS OWN CONDUCT
A UNION OF GENEROSITY AND FRUGALITY,
OF HIGH-MINDEDNESS WITH PRUDENCE
AND A STRICT AND SCRUPULOUS INTEGRITY ABOVE
THE REACH OF SUSPICION, AS WELL AS
OF REPROACH.

In Munk's Roll of the Royal College of Physicians of London, there are two estimates of Wells from contemporaries who were also friends:

> Dr. Wells was one of the most remarkable persons with whom it has been my lot to be personally acquainted. He is too well known by his writings, among which his *Essay on Dew* deserves more especial notice, for it to be worth while for me to speak of him as a philosopher, but I may venture to give some account of him otherwise. He was never married, but lived by himself, with (I believe) only a single maid-servant in a small house in Serjeant's Inn, Fleet Street. Although he had paid great attention to his profession and had ample opportunities for studying it as physician to St. Thomas' Hospital, he had never more than a very limited practice. For this, indeed, he was in many respects very unfit, having dry, and, in general society, ungracious

manners, and being apt to take offense where no offense was intended. Yet he had great kindness and warmth of heart mixed up with these less amiable qualities, and while he was greatly respected by those who really knew him, he was even beloved by the few with whom he was intimate. His autobiography, which is prefixed to the posthumous edition of his works, is very characteristic, and, when I read it, reminded me very much of that of David Hume, to whom, indeed, as to the character of his intellect he bore a considerable resemblance, however different he may have been from him in some other respects.*

This opinion of Dr. Wells was written by Sir Benjamin Collins Brodie, who knew Wells intimately, and was acquainted with the circle in which he moved, namely, with Matthew Baillie, William Lister, and David Pitcairn. Brodie attended Pitcairn in his last illness, and invited Wells to attend at the post-mortem examination, at which Baillie and Everard Home were also present.

Another estimate of Wells by "one who knew him well," but whose identity remains unknown, is as follows:

> Dr. Wells was laboriously diligent, eager, and steady in his pursuits, and less satisfied with any present success than cheered by it in his attempts to obtain greater. He was frugal, yet liberal; high-minded, and unwilling to be obliged, perhaps uneasy under obligation, but most grateful for kindness; resentful, but placable; irascible, and indulging his feelings when it arose from trifling causes, but exercising the utmost self-command under very great provocation, if the occasion was important and propriety required it; indignant at insolence and oppression, and regardless of all personal consequences in the expression of his indignation; but submissive to the appointments of Heaven, and calm and cheerful under the sufferings which flowed from them; a sense of duty was the paramount feeling in his mind, to which hatred and love, fear and desire gave way, and which danger and difficulty served only to make more active and vigorous.

Sir Benjamin Brodie, in his estimate of Wells, states that he never married, and apart from the fact that he was never in circumstances to support a wife, perhaps it is as well that he did not; but he was not a misogynist, as the following letter now in the writer's collection will go to show:

> Serjeant's Inn, Fleet Street,
> Saturday Evening, November 23 [1811]
> My dear Madam,
>
> You have obliged me exceedingly by taking the trouble to inform me who the young lady is that I met at the house of your sister at Hampstead. The steadiness of her manner, the rotundity and measuredness of her speech, the wisdom of what she said, and the little aversion which she had to be the chief speaker in company, though four older persons than herself were present, to say nothing of any other pretensions which these might have to be heard, excited my admiration. I fancied at the time that she was not more than twenty, but my friend Dr. Lister, who knows her, says that my estimate is considerably short of the truth.
>
> I shall thank your sister Johanna very much for a perusal of Miss Aikin's poem on *Women*. In return I shall send a copy of some lines on the same fertile subject, which were written by my friend Lord Glenlee, when only twelve years of age. They are to be sure somewhat bitter; but he afterwards made ample atonement for this transgression, by becoming while young, the most uxorious husband of all my acquaintance.

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* An attempt to locate a portrait of Dr. Wells has met with no success.

> You may recollect that I went to Wales in the summer to meet my friend Mr. Hume of Edinburgh, who was travelling with the view of lessening a melancholy occasioned by the death of his wife. His letters to me still constantly refer to this loss. In the last, after speaking of it, he adds:—"I find it too true, that the entire possession of one kind and devoted female heart is of more value towards the enjoyment of life, than all the other benefits put together which the world affords."
>
> I have introduced this extract in order to have a proper opportunity of saying, that, although in *theory*, I may be very heterodox concerning the female sex, I yet fully subscribe to the justice of Mr. Hume's opinion respecting the fact, to which he refers, so far as this can be justly done by a speculative bachelor, who regards himself as much too old, to seek a direct proof (of) it in his own experience. Those at least are my present sentiments. When I have added ten years to my present age and a proportional quantity of wisdom to that which I already possess, my opinion on this important point will probably have changed.
>
> I long extremely to peruse the account of the travels of your relations. The wit in it, I presume, belongs chiefly to your sister; the learning to your son; the information to your daughter and son-in-law, but the grace of combination to yourself. I have the honour of being, my dear Madam,
>
> Your most faithful and obedient servant
> Will. Cha. Wells
>
> To Mrs. Baillie

Despite considerable research the identity of the young lady described in the first paragraph of this letter, who so impressed Dr. Wells with her capacity, remains a mystery. The Mrs. Baillie to whom the letter is addressed is Mrs. Sophia (Denman) Baillie, wife of Dr. Matthew Baillie. The sister is her celebrated sister-in-law, Joanna Baillie (1762–1851), the well-known poet and dramatist. Lucy Aikin had published her "Epistles on Women" in 1810. This gives a clue to the year which should be assigned to the letter, but since Saturday fell on November 23rd in the year 1811, we must assign the latter year to it. Sir William Miller, Lord Glenlee (1755–1840) one of Wells' most devoted friends, was a Scotch judge. David Hume (1757–1838) also a judge, and nephew of the philosopher of the same name, was another of Wells' friends. Dr. William Lister (1757–1830) was of the medical circle who took Dr. Wells under charge when he arrived in London. In connection with these and other friends Wells expressed in his memoir sentiments of the deepest regard. He says:

> My last declaration will relate to the obligations under which I lie to my friends. I have already spoken of my rare good fortune, in having acquired, in the course of my life, five most intimate friends. All of these are still in being, and from all of them I have received throughout my illness, the warmest proofs of attachment. Two of them, however, have most especially afforded such proofs, Dr. Lister and Dr. Baillie, partly from their residing in London, and partly from the nature of their profession. My obligations to Dr. Lister are extreme. During the whole of my disease, he has visited me constantly twice, and sometimes thrice a day; and during each of these visits he has conducted himself towards me with fully as much kindness, as if I had been his brother.

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1. Letter to the Right Honourable Lloyd, Lord Kenyon. 1818. (Privately printed, not published, in 1799.)

Note. Dr. Wells states in his memoir that he published many small political things in Charleston, without attaching his name to them, written at the desire of General Nisbet Balfour, commandant of the garrison.

He further states: "In the expectation that my life would be prolonged, I had formed various literary projects. One was, and this had often passed through my mind during the last forty years of my life, to show that there is a material difference in the manner in which we acquire our ideas of the primary and secondary qualities of matter. If, after a closer examination of this subject than I had formerly given it, I should have found that my notions respecting it were just, I should have attempted in treating of it, to imitate, in some slight degree the inimitable manner employed by Berkeley in his Treatise on Vision. I should then have presented to the Royal Society several papers on vision, the chief of which would have treated of those phenomena of light, which would have been denominated by authors coloured shadows, ocular spectra, and by various other titles. In the last place, I should have brought together into one volume all my publications upon vision, which I would have inscribed to the memory of Robert Wells my father, in gratitude for the great exertions which he had made to give me the education of a scholar and a gentleman, when in narrow circumstances himself, into which he had fallen in consequence of the American rebellion."

The editor of the memoir volume of 1818 adds in a footnote the information that Wells made out in his own handwriting, during his last illness, a short statement of his opinion upon the subject (acquisition of ideas of the primary and secondary qualities of matter), which was placed into the hands of a philosopher, whose name was not mentioned, but who was stated to be peculiarly fitted to estimate it justly. The fate of this paper is unknown.

For help and suggestions regarding the subject for this paper I am greatly indebted to Sir Humphry Rolleston, Herbert Spencer Robinson, M.A., Miss Miriam R. Small, Sydney Turner, Esq., Mr. Fred G. Floyd, and Mr. Joseph W. Barnwell.

[From Donzelli: Teatro Farmaceutico, 1677.]

GALEN'S WRITINGS AND INFLUENCES INSPIRING THEM*

By JOSEPH WALSH, M.D.

PHILADELPHIA

PART II

Post-graduate work in Smyrna 151–152 A.D. The city and its Schools. His Preceptors and their eminence. Some of their Teaching. The beginning of his monumental Research on the Mechanics of Respiration. Cryptograms in his Writings. He goes to Corinth and Alexandria.

WHETHER or not Galen had in mind the prolonged stay he made when he left Pergamum is not known, and it is possible that he was influenced thereto by the coterie of men whom he met and studied under in Smyrna and Alexandria. Smyrna possessed at the time the greatest schools of medicine and mathematics with the exception of Alexandria, and the greatest schools of philosophy and rhetoric with the exception of Athens. In medicine well-known men were Pelops and Satyrus (II, 217); in philosophy, Albinus the Platonist, and Nicomachus the Neo-Pythagorean; in rhetoric, Aristides popularly called the Demosthenes of his age; in mathematics, there was Theon. A treatise of the last named is extant, explaining the mathematical doctrines of Plato, though he is also known for work in astronomy,[1] in both of which subjects Galen was interested.

"All Ionia" says Philostratus,[2] who was born only twenty years later, "is like a college of learned men, but Smyrna holds the highest place, like the bridge upon the cithara." Ionia extended from beyond Rhodes on the south to beyond Smyrna on the north, thus including most of the western coast of Asia Minor. "All the Muses who descend on man," says Aristides[3] with pride, "haunt Smyrna; she teems with her own sons and with foreigners; the town is the hearth of learning for the Continent." It was in Ionia the satirist Lucian pursued his rhetorical studies about seven years before[4] and then followed this profession as a teacher, principally in Arles (France) till 161 A.D.

Smyrna was second only to Ephesus in size and was the largest seaport in Asia Minor. Among the oldest cities in the world, it outranked even Athens, having witnessed the first conflict of Europe with Asia in the Trojan War. In spite of others also claiming the honor of Homer's birth, it was the only city with a representative monument to the Father of Poetry. This Homereum was in temple form and contained a heroic statue of the bard. There was even a cave near the source of the Meles where he is said to have composed his poems. Galen dignifies him by the title *the* Poet, and frequently quotes him with respect and veneration.

There was a Temple of Aesculapius on the waterfront overlooking the bay, an extension of that in Pergamum.[5] Built during Galen's lifetime due to the activities of devotees like the rhetorician Aristides and the physician Satyrus, it tends to show that here also he was influenced toward piety, particularly the worship of the god of healing. "The beauty of Smyrna" was a commonplace, and as seen from the bay, it is still one of the loveliest sights in the Levant. It was destroyed by an earthquake in 178 A.D., but was rebuilt by the generosity of Marcus Aurelius at the solicitation of Aristides and possibly also of Galen, who was at the time physician to the Emperor.

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* Part I appeared in the January issue, p. 1.

The rhetorical or sophistical school had just lost three of its most brilliant luminaries, Scopelian, Timocrates and Polemon. The last, who died about four years before our student's advent, and whom he quotes (xviii$_1$, 347) had been the friend of the Emperors Hadrian and Antoninus Pius, and had lived and conducted himself during his later life not unlike Victor Hugo after the downfall of the French Empire. He was the uncrowned King, whom everyone went to hear and considered it a royal honor to meet socially.

Smyrna was the second seaport of the world, yet the vessel was rare which failed to bring a student to the feet of these masters. In fact, Philostratus tells us that Polemon's eminence increased perceptibly the population of the city. Toward the end of his life Galen declares (v, 112) that the theory of medicine learned from the Smyrniote physician Pelops had never failed him, or to put it in his own words, "as a young man I learned from Pelops the signs of every humor and throughout my whole life even to the present day I have observed them," and when he left Asia Minor, it was to sit at the feet of Pelops' most illustrious teacher, Numesianus of Corinth (xv, 136).

We know from Galen's report of the debate in Pergamum on empiricism between Pelops and Philippus that even before coming to Smyrna he had already heard him (see Part I). Naturally, he might also have become acquainted with and listened to him on short trips to Smyrna, since it was only 50 miles distant. The principal work left by Pelops was a Manual of Hippocrates for Beginners (xix, 57) in which he discoursed on anatomy, physiology (xviii$_2$, 926; v, 530) and treatment (xii, 358; xiv, 172) and made some commentaries on the great master (xix, 57).

According to Sidonius Apollinaris[6] the most celebrated speech of Fronto, the distinguished barrister, rhetorician and teacher of Marcus Aurelius, was against a Pelops, possibly this eminent physician. It was a very common name, however, so that many other prominent men were eligible for this distinction. There was even a mountain summit behind Smyrna called "The Throne of Pelops" after the mythological Pelops the son of Tantalus and Dione, who was also the mother of Venus by Jupiter.

Pelops, had a son, a physician, Aelianus, whom we would judge to be not much older than Galen, since Numesianus, the teacher of his father, was still quite active. The Pergamite says of him twenty years later in his Dissection of Muscles for Beginners (xviii$_2$, 926):

> No one has written perfectly on the anatomy of muscles, yet Marinus more accurately than others. Since his treatise was not very orderly, the works of Pelops, Lycus and Aelianus have become popular. Pelops dealt with dissection of muscles, as well as anatomy in general, in the third book of his "Manual of Hippocrates for Beginners." Lycus wrote his longest publication on it. Aelianus treats of the dissection of muscles and of other parts of

> the body in the compend which he made of his father's anatomical writings. Lycus' dissertation is too lengthy, explains all things too prolixly, introduces questions of logic having nothing to do with dissection, and discusses diseases in no way related to anatomy. Aelianus and Pelops both stuck to the subject. I am, however, going to repeat their work, especially since I have already written two tracts on the movement of muscles.[7]

Among other differences of opinion Galen points out (xviii$_2$, 935) that Marinus considered the pterygoid and temporal muscles as one, that Pelops and Aelianus separated them, and that Lycus ridiculed the separation. Galen, of course, followed Pelops and Aelianus. Pelops described sixteen muscles in the tongue of cattle (xviii$_2$, 959); Galen differentiated twelve in the monkey, making four geniohyoglossi instead of our two, but with some justification.

Pelops placed the origin of the nerves, arteries and veins in the brain, the two latter on account of the large sinuses. It had been so ingrained into Galen, however, that the veins took origin from the liver and the arteries from the heart that he not only failed to agree with him, but was obliged to laugh when Pelops who believed they originated in the brain began his teaching of the anatomy of the veins with those of the liver (v, 543).

In his commentaries on Hippocrates written about twelve years later he recalls a case of brain injury while studying under Pelops (xviii$_1$, 29) and in others written twenty-five years later he recalls his first dislocation of the head of the humerus (xviii$_1$, 346):

> We have seen wounds of the cerebrum often cured and once in Smyrna under our still living preceptor Pelops,[8] a remarkable wound. Yet this is, of course, very rare, and it is true that large wounds such as Hippocrates appears to call cleaving [διακοπὰς] usually bring about death, and when they penetrate a ventricle all concede them fatal.

In this case the young man's wound actually did penetrate one of the lateral ventricles (iii, 664) but Galen was inclined to think that cure was the result of the special intervention of a god though if both ventricles had been wounded even the god could not have saved him. His idea was that the lateral ventricles had to do with the elaboration of psychic pneuma which circulated in and activated the nerves, and they were double, so that if one was injured the function could be continued by the other. Wounding of both meant immediate cessation of nervous activity and death (iii, 663).

In regard to shoulder dislocations he writes (xviii$_1$, 346):

> Hippocrates reports dislocation of the head of the humerus into the axilla, while more recent physicians report it also into other, sometimes even into impossible, places. We have seen dislocations of the humerus five times, the first while studying at Smyrna, the four others in Rome. In the latter four, the dislocation was forward. I am surprised that Hippocrates never saw this variety of dislocation since recent writers usually report a case or even two, though apparently no one has seen it so often as we.
>
> This is not because it happens more frequently in Rome, but medical men consult me particularly in regard to cases out of the ordinary. . . . Further, I had the advantage of seeing not only cases in Rome, but in the neighboring Ostia and Portus Augustus, while the cities in which Hippocrates dwelt contained no more inhabitants than one street in Rome. . . . In addition gymnastics have become more

and more the fashion and directors are employing contorting exercises unsuitable to the limbs. Hence, it is not surprising that I have seen so many, but rather that I have not seen more among the thousands in the palestra whom the directors and physicians encourage in these activities.

In epilepsy they were badly confused by the premonitory aura. The fact that the afflicted interpreted their sensations as if something mounted from a distant part to the head made the physicians believe that something actually did ascend. A patient (viii, 194) described a climbing cold sensation and Pelops explained that it was probably true,—that a certain vaporous very powerful quality did ascend not dissimilar to the poison of the scorpion which though small in quantity causes such dire effects throughout the body. Pelops considered that an analogous substance might be engendered in the body itself without external cause and reaching the brain produce the convulsive seizure. As a consequence, in a case of epilepsy with attacks daily and the aura in the leg, he tied off the thigh, and further attacks failing to occur, he felt he had proved his point.

Without knowledge of the causation of disease they sought out illustrations to aid in their description and understanding. One of these which Galen quotes (xvii$_1$, 521) is Democritus' clever comparison of the sexual orgasm with a petite epilepsy. This is analogous to the modern Frenchman's comparison of the sexual orgasm with a sneeze.

Their treatment of the bite of a rabid dog is interesting as an illustration of the number of needless procedures they carried out in order to obtain a result already achieved. They began with caustics (i, 88) or with cauterization of the wound which was kept open forty days and dressed with the following plaster (xii, 357; xiv, 172):

℞ Pitch (Picis Brutiae)........	℥xii
Juice of Panax (Opopanacis)	℥iv
Vinegar..................	Fl℥xviii.

Boil the pitch in 12 ounces of the vinegar, dilute the opopanax in the remaining 6 ounces and mix. Take care to prevent effervescence. *Sig.* Poultice thick on the wound.

In addition, Galen's Pergamenian teacher, the Empiric Aeschrio, "that most skilful old man in materia medica" as he calls him, recommended internally burnt river crabs which he always kept on hand (xii, 356). The crabs were consumed to ash on a pan of red copper in early autumn after the appearance of the dog star when the sun was passing through the lion on the eighteenth day of the moon. The crabs were placed on the pan alive. The ash was reduced to powder and drunk in water every day for the forty days the wound was kept open. Pelops, who also used this remedy, explained (xii, 358) that the cure was the result of the action of the water animal on a dry disease, and he insisted on river rather than sea crabs because the salt in the latter was also drying which would only intensify the disease. It was this dryness which made those afflicted with rabies fear water. And Galen adds "Pelops stated this on the weight of his authority, priding himself that he knew the causes of all such things." That good results were frequently obtained is likely, in fact Galen states that not one who used this treatment is dead (xii, 359), but it is evident to us that the cauterization, or this and the plaster over several days completed the story.

That he devoted himself very assiduously to medicine during this one year in Smyrna we know from his statements as well as from the fact that he wrote a treatise in three books on the Movement of the Lungs and Thorax, his first on this subject on which he later made important discoveries. It was of sufficient excellence to be complimented by his teacher, the eminent Pelops. The first two books dealt with dissection of the thorax, the action of the lungs and the movement of the intercostal muscles and diaphragm; the third was a compilation of the opinions of his preceptors on the subject (II, 660).

This work was written for a school fellow about to return to Pergamum after a long absence who wished to give an anatomical demonstration of something he had learned (XIX, 17; II, 217). He, however, died and it fell into the hands of another who had the temerity to add a preamble and read it as his own. "But," Galen says, "he was readily found out, because it was known to be my work, and in addition I had put at the end of the third book a little cryptogram by which I could prove it." With this in mind, and since he tells us other writings were also plagiarized, it would not be surprising if cryptograms were introduced into many. Search through several, for instance, his important treatise on the Natural Faculties, was without success. Anagrams of his name were not difficult to find, but it is so short and the letters comprising it are so common that the anagrams are probably accidental.

Satyrus and the great Pelops taught that inspiration was brought about by the action of the diaphragm and intercostal muscles, expiration by the diaphragm alone (II, 657–661). Seven to ten years later after considerable anatomical research and numerous vivisection experiments Galen discovered and demonstrated the decussation (III, 596) of the fibers of the intercostals and how this provided for both inspiration and expiration. At the same time he showed the participation of the chest muscles (II, 658). How far he carried these investigations as a student is unknown, though he tells us (II, 217) that in this work "he had little great or new to say." The fact, however, that it was plagiarized would lead us to think that not all the ideas contained in it were old and commonplace.

The standing of Satyrus and what he taught has been pointed out in the previous part where we saw him a teacher in Pergamum for four years. Galen does not mention studying under him in Smyrna, but his never failing regard makes likely the continuance of at least their friendship, with Satyrus aiding in all possible ways.

One of the patients he reports as having seen in Smyrna was Nicomachus who had become so fat he could not move. He was restored to health at the Shrine of Aesculapius in Pergamum (VI, 869). It was particularly in cases of this kind requiring a dietary regime and stimulation of character that the priests were often successful.

Nicomachus was a philosopher and the chief representative of the Neo-Pythagorean School. Commentaries on his work on Ethics by Aspasius the Peripatetic are still preserved. He taught the pre-existence of numbers in the mind of the Creator before the formation of the world, and in conformity with these as an archetype He ordered all things.[9] As we shall see later Galen was considerably influenced in this direction and if not by Nicomachus, by the thought prevailing at the time.[10]

That he was active in philosophy as well as medicine is known from the fact that he came south for the purpose of studying under not only the physician Pelops, but the Platonist Albinus. This philosopher was at the time the Academy's most celebrated pupil. A modern edition of his works was published in 1852.[11] There is reason to believe it was while under Albinus he wrote some of the articles on Plato thought by Ilberg to have been written as a student in Pergamum (see Part I), particularly his eight books of Synopses of Plato's Dialogues.

From very many quotations, second only in number to those from Hippocrates, it is evident Galen knew the Founder of the Academy almost word for word, and sometimes quoting without consulting the original, he fails in exactitude. Plato was not only the chief authority in philosophy, but his Timaeus was depended on in the study of physiology and biology. It is quite certain one of Galen's studies was this dialogue, and it is possible some of the notes for his four books on Medical Statements in the Timaeus published at about the age of forty-three were written at this time. To understand much of Galen's physiology and biology the Timaeus should be read, and to a physician it is one of the most interesting of Plato's works.

Galen appears to have remained about one year in Smyrna. On his own authority we know that he left Pergamum at the age of twenty-one and returned to it at twenty-seven having spent some time in Smyrna, a very short time in Corinth and five years in Alexandria.

Proud of his association with Pelops and stimulated by his instruction he betook himself to Corinth to study under his teacher Numesianus (II, 660; XV, 136), the greatest living pupil of the renowned Quintus (II, 217).

We know almost nothing of the medical school at this, the new capital of Greece. The ancient city, the Corinth of Diogenes, had been utterly destroyed by Mummius (146 B.C.), and for a hundred years its soil was a desert. In the year 46 B.C. Julius Caesar rebuilt and made it an important Roman colony peopled with freedmen. Under its new name, Laus Julii, Augustus constituted it the capital of Greece and Hadrian enriched it with public works.

Situated among the undulating hills of the Isthmus overlooking the beautiful bay with the snow-capped summit of Parnassus visible to the north, it was, none the less, not a city of poets and literateurs, but of iron foundries and allied industries, a miniature ancient Pittsburgh. It was the richest and most densely populated municipality of Greece, thoroughly Roman in both its appearance and its population, in its buoyant prosperity and its brutalizing profligacy. This was the Corinth to which Galen came to study under the well-known Numesianus.

Shortly after his arrival this brilliant teacher departed for Alexandria (II, 217), and Galen either accompanied or followed him, his sojourn in Greece being short, and though he almost surely paid a flying visit to Athens, we leave its description till his third visit (about 179 A.D.) when his friends Alexander Damascenus occupied the chair of peripatetic philosophy and Adrian of Tyre that of sophistry, the most sought after professorship in the Empire. Since we know Galen arrived in Alexandria in September or October 152 A.D., it would appear that he finished his course in Smyrna in the Spring, went to Pergamum to arrange his business affairs, and then to Corinth, for on leaving Asia Minor we have no reason to believe he returned to it for five years.

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7. From this paragraph is derived the presumption that Aelianus was the son of Pelops, though Prendergast (The background of Galen's life and activities, and its influence on his achievements. *Proc. Roy. Soc. Med.* 23: 1136, 1930) makes him the son of Aelianus Claudius, who apparently died about 222 (Encyclopedia Britannica under Aelian) while Galen died about 200 A.D.
8. The edition we possess of this work "Commentaries on the Aphorisms of Hippocrates" is apparently from about 178, but this reference to Pelops living probably comes from an earlier edition, written between 163 and 166. The reference to the dislocation of the humerus comes from "Commentaries on Articulations" written also about 178 A.D.
9. Nicomachus of Gerasa. Trans. by Martin Luther D'Ooge, N. Y., Macmillan, 1926, p. 187.
10. Some of this influence is brought out in my article: Galen's studies at the Alexandrian School. Ann. Med. Hist., s. I, 9: 132–143, 1927.
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SHAKESPEARE'S MEDICAL KNOWLEDGE WITH PARTICULAR REFERENCE TO HIS DELINEATION OF MADNESS

A PRELIMINARY SURVEY OF CRITICAL OPINION

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WILLIAM SHAKESPEARE is undoubtedly the greatest poet-dramatist of all times. Is he also the grand universal genius so many have made him out to be?

How shall we approach this enigma, this phenomenon of nature? What shall we say of his all-pervading, all-comprehensive knowledge? The critics again and again have dipped their pens, taxed their ingenuity for superlatives, ransacked their brains for fitting eulogies and ended in a confusion of exclamatory rhetoric. Classical learning was his and a lawyer's acquaintance with law, and a knowledge of the healing art. His classical knowledge he might have obtained through education and reading. His legal knowledge he might have acquired clerking in a barrister's office. And the facts of his medical knowledge he might have acquired in a similar manner. But what of his advanced views, his snatches of vision into physiological and pathological phenomena not known until the present day? What of his psychological delineations of psychoneuroses and insanity? Here we have pure genius. Here we have an elemental force of Nature to reckon with. We stand aghast at the enormous conceptions of his mind.

Why has not Shakespeare's medical knowledge occupied as much of the attention of critics as has his classical knowledge or his legal knowledge? While chapters and even whole books have been devoted by the accepted critics of the twentieth century to these subjects, yet only paragraphs have sufficed for his medical knowledge. And yet the subject is well worth an extended study. Possibly the reason is obvious. Literary critics have feared to tread on unfamiliar ground. There are few critics who are doctors, and fewer doctors who are literary men. At any rate the situation remains. Criticism of Shakespeare's medical knowledge has taken the form of exposition rather than that of criticism. Medical critics have, for the most part, merely listed the references to medicine found in Shakespeare's plays. Very few have attempted to analyze these references or to evaluate them as medical knowledge. It is the purpose of this paper to trace as completely as possible and to evaluate as completely as possible the attitude of critical opinion on Shakespeare's medical knowledge with particular reference to his delineation of madness.

Generally speaking, practically all critics accord to Shakespeare an extensive knowledge of the healing art. Thus as far back as 1859, Dr. A. O. Kellogg[26] speaks of the "extent and accuracy of the medical physiological . . . knowledge" of Shakespeare, holding also that "there is scarcely a department of scientific knowledge which he has not enriched." And as late as 1930 we find Dr. V. B. Green Armytage[92] speaking of Shakespeare's "enormous wealth of medical lore" and remarking that " . . . it is astounding to discover the wonderful knowledge of physiology, pathology and psychology to which the plays bear witness." While in the intervening years, voices of praise are hardly lacking. Dr. Bucknill, 1860, Dr. Bradnack, 1879, Dr. Knott, 1903, Dr. J. F. Rogers, Dr. Walter Lindley and others, all attest to "Shakespeare's intelligent familiarity with every branch of medicine,"[125] and his "thorough mastery of the principles of the healing art,"[112] Dr. Knott going to the extent of holding that "Shakespeare's ideas were in advance of even the average medical knowledge of his time."[112] And Dr. Rogers (1916) even goes to the extreme of considering that "from the twentieth century point of view, he was, and is a great physician . . . teacher of health (who) stands among the first."[150] Indeed, when we consider that there are close to five hundred quotations containing references to medicine; when we consider that practically every then-known disease is mentioned in the plays; when we consider that the plays show evidence of Shakespeare's familiarity with the most important medical theories then in vogue, we cannot but wonder at the agreement of the critics. However, carried away by the idolatry that Schlegel, Coleridge, Hazlitt and others infused into the century to the point of saturation, most of these critics have succumbed to the temptation of substituting all too often, a blind adoration, for clear-eyed logic. They have fallen into the error of regarding Shakespeare's medical knowledge not in the light of the medicine of the sixteenth century, but rather in the light of the medicine of modern times. Consequently they have read into his works things which are not there at all. The tendency has been to give too liberal an interpretation to the medical knowledge in the plays. Matters of general medical knowledge, no doubt common to all people, have been considered as showing Shakespeare's unusual knowledge of medicine. Thus references to fever, nausea, vomiting are put down as showing Shakespeare's medical knowledge. Even the drugs mentioned in Shakespeare's plays, while not familiar to the average person today, were well known and even in common use in the days of Shakespeare. And that is not all. Shakespeare has had foisted upon himself the weighty honor of discovering the circulation of the blood, one of the greatest discoveries in medical history. He has been considered as evincing a knowledge of the action of antitoxins. He has been considered as antedating Newton in the discovery of the laws of gravity. There are other fantastic claims of like nature. Suffice it to say, these claims probably have more root in the minds of the critics than in the mind of Shakespeare.

There is another consideration which few critics have recognized. They have considered the medical knowledge in Shakespeare's plays as something unique and unusual among dramatists. The fact of the matter is this: That medical knowledge is also abundant throughout the plays of Shakespeare's contemporaries. Physicians were commonly introduced into plays by Elizabethan dramatists, and with even greater freedom than Shakespeare did. Thus as admirably pointed by Dr. Arthur W. Meyer, Chapman, Marlowe, Marston, Ford, Massinger particularly, Beaumont, Fletcher, Middleton, all show a varying medical knowledge, all introduce physicians and surgeons into their plays with greater frequency than does Shakespeare. It seems to have been a characteristic of the times. Then, too, the practice of medicine was not organized as it is today. Medical knowledge and medical practice were in the hands of anybody and everybody. Empiricism was the order of the times. As a matter of fact, an act of the English parliament in 1543 conferred the right to practice the healing art on "Every person being the King's subject having knowledge and experience of the nature of herbs, roots and waters, or the operation of the same by speculation or practice."[32] Consequently, "simple women, carpenters, pewterers, braziers, soap ball sellers, apothecaries, avaunters"[32] are enumerated by Dr. Caius as practicing the healing art. Dr. Cotta (1612) mentions the "swarms . . . in this kind, not only of tailors, shoemakers, weavers, midwives, cooks, and priests, but witches, conjurers, jugglers and fortune tellers."[32] Medical knowledge was more folklore than fact, more superstition than science, as much the concern of the layman as of the doctor, as much the subject of ordinary conversation as the weather or the outcome of the crops. But even the medical profession itself had not risen above the pall of the Dark Ages. It was Galen and Hippocrates and Hippocrates and Galen: these bound medicine with the cords of traditional doctrine; these ruled over science with the tyranny of accepted authority. The status of the healing art was worse than it was two thousand years previous. It had become a matter of hearsay, empirical, the common property of all classes of people, the servant, the wise-woman, the courtier, the artisan, the friar, the schoolmaster, the libertine, the King, etc., etc. And in very truth, the plays of Shakespeare represent almost every walk of life as possessing medical knowledge. It is through these and not through his physicians that he manifests his knowledge of the healing art. Thus there is Doll, Mrs. Quickly, Bault, Falstaff, Speed, Biron, Bardolph, Ulysses, Iago, Warwick, Portia, Cleopatra, Brutus, Leontes, Marcius, Friar, Laurence, Troilus, Titania, Casca, Caesar, King Richard, Cerimon, Helena, and others: these are the ones in whose mouths Shakespeare puts his medical knowledge. He was doing nothing more than representing the sixteenth century itself in this regard.

So when we consider this entire state of affairs, is it any wonder that the dramatists of the time and particularly Shakespeare with his keen sense of observation show such an extensive medical knowledge? Furthermore, the fact that Shakespeare's son-in-law was a doctor certainly contributed to his interest in the subject. Dr. Newton Hawley says that " . . . it is not unreasonable to suppose that he had become acquainted with the theories of the older medical writers through conversations with his son-in-law, the physician of Stratford, Dr. John Hall."[99] Dr. V. B. Green Armytage is also of the opinion "that . . . some of his wealth of clinical observation may be attributed to this close association with Dr. Hall."[92]

Nor is this all. Shakespeare's supposed medical knowledge has been considered by some to have been derived from certain medical books which he might have had access to, possibly even in manuscript form. Thus Dr. W. B. Richardson and others believe that Shakespeare read Helkiah Crooke's book on Anatomy "for the closer this book and the book of the plays are read together the more clearly is it detected where and how the dramatist became the student of anatomy."[99]

Bearing all these factors in mind and in the light of their consideration, let us proceed into a more detailed discussion of the subject.

The sixteenth, seventeenth and eighteenth centuries are practically mute with regard to comment on Shakespeare's medical knowledge. Nor is this to be wondered at, for these centuries were in general indifferent to Shakespeare's greatness. It is not until the nineteenth century that the critics awoke to the all-sided, myriad-minded, universal genius evident in the plays of Shakespeare. But as is the way with human nature, these critics swung to the opposite extreme, and as a result of the leadership of Schlegel, Coleridge, Hazlitt and others of their school, Shakespeare came to be idolized as an all-knowing, all-comprehensive, "Oceanic" mind. The attitude of criticism on his medical knowledge did not escape this spirit of idolatry, although the critics did not go to the same extremes. That Shakespeare was familiar with the medical lore of the times all critics agree. That he was acquainted with the principles and theories of the medical writers of the past and of his own time, none denies. But that he had any special or technical knowledge of medicine or that he made any scientific discoveries, here is where there are differences of opinion. This much, however, can also be said: that unlike the clash of opinion as regards Shakespeare's classical knowledge or his legal knowledge, there is surprisingly little controversy as to his medical knowledge. As already stated medical critics seem to have been satisfied with exposition and the mere pointing out of medical references rather than with real criticism. And so there is hardly a work on Shakespeare's medical knowledge that is worthy of the name criticism.

As early as 1815 we find Bell's "Principles of Surgery," Volume 2, quoting Shakespeare in the capacity of a physician. In this regard, we quote the following: "My readers will smile perhaps to see me quoting Shakespeare among physicians and theologists but not one of all their tribe populous though it be, could describe so exquisitely the marks of apoplexy conspiring with the struggles for life and the agonies of suffocation deforming the countenance of the dead. . . . "[19] It is obvious here that this is rather a tribute to his sense of observation rather than to his medical knowledge. And who can deny that Shakespeare's powers of observation and his genius for language are unsurpassed? That is what his greatness rests upon. But we must beware of falling into the error of confusing such abilities with actual medical knowledge as so many of the critics have done.

Continuing further, George Farren published a book on the medical knowledge of Shakespeare in 1826 in which there are "Observations on . . . Rates or laws of Mortality . . . Illustrations of the progress of Mania, Melancholia, Craziness, and Demonomania as displayed in Shakespeare's characters of Lear, Hamlet, Ophelia and Edgar; on the comparative danger of first and subsequent births, etc, etc." This work falls into the category mentioned before: it contains references to medicine in the plays but little criticism.

The most important and dominant medical critic of the nineteenth century, however, is Dr. J. C. Bucknill. His two books, "The Medical Knowledge of Shakespeare" and "The Mad Folk of Shakespeare" are still looked up to as authoritative works. The latter of these books we shall consider in its appropriate place later. But in his first mentioned book published in 1860 Dr. Bucknill gathers together all the references to the healing art present in each play, and he does this, as most of the other medical critics do, without regard to the merits of these references as medical knowledge. He does come to a conclusion, however, as follows: "I have arrived at the fullest conviction that the great dramatist had at least been a diligent student of all medical knowledge existing at the time,"[8] and that " . . . his mind was deeply imbued with the best medical information of his age,"[8] having " . . . authority even for his trivialities and most glaring absurdities."[8] Dr. Bucknill restrains himself however. In comparing his knowledge of law with that of medicine he says:

> Shakespeare's knowledge of law is technical, while his knowledge of medicine is general and such as he might have more readily acquired outside the professional limits. His knowledge of law is that which a clerk might possess; his knowledge of medicine is evidently the acquirement of a riper age capable of revolving observation into principle.[9]

Another work of importance published in 1884 is "Shakespeare as a Physician" by Dr. J. Portsmouth Chesney. Here again, for the most part, we have a mere cataloguing of medical references under medical headings, but little actual criticism. Dr. Chesney is not as lavish as Dr. Bucknill in the praise of Shakespeare's medical knowledge. He attests to the "accuracy of Shakespeare's Therapeutics." He considers that "it is . . . wonderful to note the accuracy of Shakespeare's knowledge even in . . . medical thought." But he does not believe that Shakespeare made any special effort to study the healing art. With this, Dr. Newton Hawley agrees for he considers that "his learning is not of the pedantic sort, too common with scholars, but is drawn from the book of nature and does not lead him into serious mistakes."[99] Dr. Hawley, furthermore, is definitely against those who consider that Shakespeare had any real medical knowledge. He grants the fact that "the poet was familiar with the theories of the older medical writers." But as to his actual medical knowledge, he distinctly says: "It has seemed to me that the medical learning of the poet has been rather alleged than proved"[99] "and I cannot see . . . any evidence of medical or scientific knowledge that would have been at all astonishing in an intelligent and observing layman.[99]" And in very fact when we go through the plays of Shakespeare the medical expressions found that can be called technical and unfamiliar possibly to the layman, can barely be counted on the ten fingers. In the words of Dr. Arthur W. Meyer, "The technical expressions are few, come from the lips of lay characters, and have in some cases been traced to non-medical sources which must have been familiar to Shakespeare."[130]

In a like category with the critics mentioned before is Dr. B. Rush Field. In his book, "Medical Thoughts of Shakespeare" (1885) he asserts that Shakespeare's "mighty mind seems to have teemed with the knowledge of . . . medicine . . . and . . . has furnished some of the finest specimens of the medical character that have ever been drawn by any writer." To this latter, Dr. Bucknill strongly agrees for he speaks[9] of the "the high honor and worth with which Shakespeare invests the physician . . ." saying that "it would be easy to prove . . . that throughout Shakespeare's writings there is no character held in more honour than that of the physician."

These statements are only half truths and they certainly need modification. The doctor in Shakespeare's plays is not so noble as some of these critics would have us believe. What of the English doctor in Macbeth evincing a belief in witchcraft and the cure of the King's Evil, "that despair of Surgery," by the touch of the hand of Edward the Confessor because:

> Such sanctity hath heaven given his hand.

What of the Scotch doctor in this same play with his tactlessness and his mercenary spirit admitting that:

> Were I from Dunsinane Away and Clear
> Profit again should hardly draw me forth.

What of Dr. Butts in Henry VIII without any medical rôle at all, and Dr. Caius of "The Merry Wives of Windsor" serving merely as "an indiscreet love maker, a rival of the imbecile Slender, a thoroughly farcical eccentric who pronounces everything awry!"[131]

What of the words that Shakespeare puts into the mouth of Timon:

> Trust not the physician;
> His antidotes are poison . . .

and into the mouth of King Richard in prayer:

> Now put it Heaven into his physician's mind
> To help him to his grave immediately.

It is true Cerimon was a noble character. But we must consider all the works of Shakespeare in making estimates and writing opinions.

But let us disregard all this. Allow that he did hold the physicians in "high honor" he certainly does not make them play important rôles. They entered into the plays simply as incidentals and are not even made the instruments for his medical utterances, for, as mentioned before, it is the laymen in the plays that show the greatest medical knowledge. "Indeed," as Dr. Meyer says, "it would be impossible to recognize the physicians themselves from the facts which they express."[131] Surely if Shakespeare had wanted to exalt the physician he would certainly have done so in a more flattering manner.

Turning now to Shakespeare's knowledge of physiology, we find critics giving him an especial amount of credit for his knowledge of this branch of medicine.

Thus Dr. A. O. Kellogg in his article "William Shakespeare as a Physiologist and Psychologist" (1859)[108] considers that "the knowledge displayed was very far in advance of the age in which he lived. . . . In fact . . . a very complete physiological and psychological system could be deduced from the writings of Shakespeare—a system in complete accordance . . . with that which we now possess as the result of scientific research and experience of the last two centuries." Dr. Kellogg further speaks of the "extraordinary amount of physiological knowledge possessed by Shakespeare" stating that "on this subject he has anticipated the scientific discoveries . . . of nearly two centuries," no doubt including the circulation of the blood.

The strongest proponent of the latter matter, however, is Dr. Orville W. Owen of Detroit; Dr. Owen set out to prove that Bacon was the author of the works attributed to Shakespeare. In common with all those who wish to make the plays teem with knowledge enough to make them worthy of Bacon, he envelopes Shakespeare in the purple toga of actual medical knowledge and accords to him the credit of discovering the circulation of the blood, in preference to William Harvey. He quotes many lines to prove his contention. Like many Shakespearean fanatics he does not quote the lines that show the fallacy of his belief. Dr. Owen says[33] that Shakespeare "was perfectly familiar with the experiments and proofs of the circulation of the blood" and that "he was either the original discoverer of the great anatomical and physiological truth or knew intimately the experiments and dissections upon which it is based." He concludes that Shakespeare "must either have dissected the human body or at least seen it done" and further that "if William Shakespeare wrote the plays bearing his name, he discovered the circulation of the blood."

With the exception of Dr. J. W. Wainwright who considers that "it is quite certain that Shakespeare anticipated Harvey in a knowledge of the circulation of the blood"[170] and of Dr. Kellogg who considers "that many passages from his dramas seem to indicate a pre-existent knowledge of this great physiological fact,"[108] there are few critics who agree with Dr. Owen. Thus Dr. John Moyes in his book, "The Medicine in Shakespeare" (1896) contends "that notwithstanding the frequent references in Shakespeare to the circulation of the blood, he had no notion of its course as understood since the discovery of Harvey."[32] Likewise Dr. L. K. Hackman asserts "that he knew nothing of the circulation of the blood. . . ."[98] And Dr. Knott only finds "glimpses of knowledge of the circulation through the plays of Shakespeare."[112] This controversy serves only to illustrate how far Shakespearean fanatics can stray from the path of logic and the atmosphere of reason.

Surgery, too, obstetrics, syphilology, therapeutics, materia medica, general medicine: all these branches of the healing art are well represented in Shakespeare's plays, all come in for laudatory commendation at the hands of the medical critics. Thus Dr. John Knott remarks that Shakespeare's "knowledge of the principles of Surgery and Medicine was nowhere behind the professional knowledge of his day."[112] And Dr. Field says that, "Obstetrics was Shakespeare's favorite branch of the profession."[19] And Dr. J. F. Rogers writes that "Shakespeare paints the picture of the victim of venereal disease with no sparing of pigment and with no uncertain sweep of the brush."[150] There are others and others.

A good lawyer can prove that black is white and white is black. A good politician can convince an audience of the grossest absurdities. But a

Shakespearean fanatic (and one and the same one) can prove that Shakespeare did not write the plays attributed to him; that he did write the plays attributed to him; that Bacon was the author of the plays; that Marlowe, Fletcher and others were the authors of the plays; that Shakespeare was a classical scholar; that he was not only a classical scholar, but could not even read or write; that he was a lawyer or at least a lawyer's apprentice; that he knew nothing of law; that he was a topical dramatist; that he was not a topical dramatist; that he was a great physician, a geologist, an astronomer, an agriculturist, etc., etc., etc. How the spirit of the author of these plays must laugh up his sleeve at the deluge of ever-increasing waves of literature about the products that his brain conceived, possibly only in the hope of pure entertainment for rustics, possibly only in the plagiarism of preexisting plots and plays, possibly only to conform to the portliness or the adolescent change of voice, or other physical characters of the actors of a company, or possibly only for the mere satisfaction of a passing whim!

We shake ourselves free from the anesthesia of reason often brought on by these fanatic critics. From a logical standpoint, is it necessary to make Shakespeare a classic scholar, a great lawyer, a great physician? The far sanest attitude is this: That in the works of Shakespeare, we have a keen brain, an observing mind, a fine memory, a general education, and above all a mighty genius for using language; that out of these attributes, and these alone he fashioned unconcernedly, the great works we know by the name of Shakespeare.

If the medical knowledge of Shakespeare has produced comparatively little controversy, his knowledge of psychology and his delineation of madness have produced hardly any at all. No one doubts Shakespeare's uncanny psychological insight into human nature. No one questions his ability at depicting the play of the human passions. No one can regard his delineation of the psychoneuroses without wondering at their intensity and their power. Every new advance in the field of psychology finds conformity in the characters of Shakespeare. For Shakespeare knew human nature, and he depicted it with truth. And human nature does not change with time. Therein lies the real greatness of the man. There are portions of all of ourselves in the characters of Shakespeare. And therein lies the only source of real controversy. Depending upon our experiences in life, and possibly on our heredity, is our interpretation of psychological action in Shakespeare's characters. Controversy involves only these interpretations. For as mentioned before, practically all critics agree that Shakespeare knew the human mind and could depict the play of the passions even unto a delineation of madness. Let us listen to the voices of these critics. They resound with nothing but expansive praise, and this from specialists in pathological psychology, physicians to the insane.

Dr. Isaac Ray (1847) feels that "in his knowledge of insanity Shakespeare was in advance of his own and succeeding generations" and that "in the pages of Shakespeare are delineations of . . . (insanity) that may be ranked with the highest triumphs of their masterly genius."[147] With regard to the treatment of the insane by Shakespeare, in contrast to the treatment in vogue at the time, Dr. Ray comes to the conclusion as follows: "Would that we were able to say that courts of our own times have entirely avoided this error and studied the influence of insanity upon human conduct more by the light of Shakespeare . . . than of metaphysical dogmas and legal maxims."[147]

Dr. J. C. Bucknill (1867) likewise goes into veritable spasms of praise for Shakespeare's ability in developing psychological situations. He speaks of his "intimate knowledge of the normal state of the mental functions in every variety of character."[9] His unbounded enthusiasm finally takes him to the height of saying that "Shakespeare not only possesses more psychological insight than all other poets but more than all other writers."[9]

Dr. A. O. Kellogg, too, speaks of "Shakespeare's intuitive psychological knowledge." He points out that contrary to the practices and beliefs of the time with regard to insanity, "Shakespeare . . . believed that insanity was a disease of the brain and could be cured . . . by judicious care and management, all of which he [Shakespeare] points out as clearly as it could be done by a modern expert." He quotes Dr. Brigham, head of an asylum in Utica, to the effect that all of Shakespeare's insane characters could be found in his institution and further that there was "little to add to his method of treating the insane." With regard to certain phases of insanity, Dr. Kellogg "is struck with wonder and astonishment, that one man (and he a layman) should have known more of this most obscure subject than all the physicians of his time, [and should have] exhibited a knowledge of the operations of the mind . . . far beyond that of his own times, and quite equal to that of the most accomplished psychologists of our own." Finally, a consideration of Shakespeare's fools and clowns leads Dr. Kellogg to speak of the "galaxy of fools such as nowhere else is to be found" and of "every shade of folly, imbecility and mental obtuseness . . . represented. . . . So extensive, varied and rich is Shakespeare in his illustrations of the almost endless forms of mental imbecility."[26]

There are others and others of lesser importance but of later date. But there is certainly no change in the attitude as to Shakespeare's knowledge of psychology and of insanity. Thus the disciples of Freud even consider that "the myriad-minded Shakespearean writer had an intimate knowledge of the truly mentally diseased."[54] And Dr. J. F. Rogers (1916) considers that "as a minister to the mind . . . he has no peer."[150] And even in 1928 we have Dr. G. E. Price speaking of "Shakespeare as a neuropsychiatrist" saying that "his insight and analysis of the workings of the human mind is something at which to marvel," and that "Shakespeare has given us descriptions of the epileptic fit, so accurate that one could hardly doubt but that he had personally witnessed such an occurrence," and that "Nowhere . . . do we find so many and such remarkable descriptions of senility as we find in the writings of Shakespeare."[145] From all this mass of laudatory evidence we can only say (and we say it in the words of William Cullen Bryant): "What a physician might he not have made to an insane asylum."

Thus far we have merely taken up the attitude of critical opinion on Shakespeare's psychological insight into human nature and his ability to delineate the forms of madness. One is struck by the absolute agreement of critics on this matter. There is not a dissenting voice that would detract from Shakespeare, this real foundation of his greatness. However, as already mentioned, there are matters with regard to the interpretation of Shakespeare's psychology, with which critics are greatly at variance. Hence we have the unceasing Hamlet Problem, the Problems of Lear, Macbeth, Othello, etc., problems which will forever occupy the minds of critics because they can never be settled.

Shakespeare knew human nature, and he observed it in all its intricate forms. Besides his intuitive insight into the human mind his opportunities for observation of human action, particularly in the mentally deranged, were indeed very numerous. The insane in Shakespeare's days were not confined to asylums. Except in the case of those that became dangerously maniacal, the insane were allowed to mix in society, and Shakespeare must have observed all the degrees of mental derangement, as well as of emotional instability. And with the ability of a master he reproduced these for us in his plays. It is true, as the critics hold, that Shakespeare paid special attention to the abnormal states of mind and even of madness. But here again, this is certainly not unique with Shakespeare. We must remember to consider him in the light of his own times only. And as pointed out, insanity was more common all about him, than about those of the following centuries. In fact, Shakespeare's contemporaries also introduced madness and mad scenes into their plays, "such are to be found in Marlowe, Green, and Peele,"[130] as Dr. A. W. Meyer points out. The wonder of the situation is this: Not that Shakespeare depicted madness; but that with the insane all about him being regarded as possessed of the devil or evil spirits; and treated accordingly with the utmost cruelty, chained, flogged, starved, stoned, cast into dungeons, made the butt of amusement of the rabble of the streets as well as of the nobility, that with this situation maintaining, Shakespeare should have regarded the insane as really sick in mind and body and to have proposed, as treatment for them, rest, music, gentle conduct toward them, conceptions several centuries in advance of the physicians of his time.

But further, be that as it may, the important reason that Shakespeare was so interested in the abnormal states of mind is not that there was so much madness all about him, nor that it was a custom of the dramatists of the time, but rather because these abnormal states gave Shakespeare greater play for his psychological abilities and his delineations. Would you have the states of mind and the interaction of petty motives of the ordinary humdrum everyday life depicted? You would only have gross comedy. The quiescent volcano gives no evidence of the boiling chaos in its depths. Calm nature gives us no glimpse of the destructive furies inherent in her elements. But let the volcano erupt, and you have a seething, flaming spectacle consuming with its boiling vomitus everything about it. Let the furies of Nature's elements loose, and you have the spectacle of a world convulsed in writhing tetany, of stabs of lighting, and torrents of rain, and mighty storm of winds.

Shakespeare was too good a psychologist not to have availed himself of the wide range for psychological delineations, present in the abnormal states of mind. But he did not choose actual insanity or madness for that would have made an end to his purpose. With the exception of Ophelia only, who commits suicide, there is not a single character that we may definitely consider insane in intellect and emotion. Shakespeare chose rather to depict the borderline between madness and normality. He takes that wavering twilight of the mind between sanity and insanity, to which so many of us, under stress, are so subject, and he paints for us such stirring drama. He takes the delicate stringed lyre of the human soul, and he sends the sharp and howling winds of the passions through them, until torn and tattered, and beaten about, they emit an inharmonious, raucous, wailing din of noises. He takes the human heart, and he allows the flames of jealousy to play upon it; and he sears it with the cautery of ingratitude; and he sends it down into abysmal depths of melancholy, until out of all this we have an Othello, Lear, Macbeth and a Hamlet.

But let us get back to the critics and to a consideration of some of the individual characters.

As stated before, Shakespeare did not really portray actual insanity in the real modern sense of the word. He was rather interested in the prodromal period before insanity. He depicted rather the psychoneuroses, in the modern sense of the word. Whether he did so consciously or not matters very little. Critics, especially the non-medical critics, have for this reason failed at a true estimate and a true analysis of some of Shakespeare's characters. Up to the middle of the nineteenth century insanity was only considered such when the intellectual faculties gave way; no attention was paid to the emotions. Hence, Lear is not considered insane by Coleridge, Hazlitt, Schlegel, Hallam and others until the reasoning powers give way toward the last of the first act. This has led these critics into great difficulties to explain some of the actions and inconsistencies. Thus Coleridge considers the first part of this drama as bound in improbability for he says "Lear is the only serious performance of Shakespeare, the interest and situations of which are derived from the assumption of a gross improbability."[9] The difficulty is that Lear has been considered a sane man by these critics. All doubts disappear, however, when, as Bucknill points out, Lear is considered a case of senile dementia, not only from the beginning of the play but previous to it. Thus Dr. Bucknill says, "The accepted explanation of Lear's mental history, that he is at first a man of sound mind . . . is a gross improbability . . . but if . . . it be accepted that the mind of the old king has, from the first, entered upon the actual domain of unsoundness, the gross improbability at once vanishes. . . . " Lear's emotions are effected long before his intellect. Dr. Kellogg also is not in sympathy with those who regard "the ingratitude and unkindness of his daughters" as the cause of his insanity. This he states is the view entertained by those critics who are "far more ignorant of psychology than the poet who wrote two hundred years before them. . . . " Dr. Kellogg further states that: "In none of Shakespeare's plays . . . is the psychological knowledge of the dramatist more admirably exhibited than in Lear." And he holds, "with a late distinguished psychologist, [that] the case of Lear is a genuine case of insanity from beginning to end, such as we often find in the aged."

In fact all critics today, who have any special knowledge of pathological psychology, consider Lear as a case of genuine senile dementia. And all critics are unstinted in their praise of Shakespeare's marvelous ability at portraying this condition from the very beginning to the very end. They wonder at the little touches here and there, and the little psychological details, which only specialists can recognize as significant. Thus Dr. Kellogg points out that "With great psychological exactness Shakespeare has from the first endowed Lear with those mental peculiarities and eccentricities which experienced medical psychologists recognize at once as the forerunners of confirmed mental disease. . . . " Speaking of Lear's consciousness of oncoming madness, Dr. Kellogg refers to the truth of this observation, saying that "It is one of the most common things in the world to find a man decidedly insane and yet conscious of his infirmity." Dr. Bucknill agrees with Dr. Kellogg in this respect saying, that "this self consciousness of gathering madness is common in various forms of this disease." The psychology involved in the scene of Lear on the heath, calls forth the following from Dr. Kellogg: "Nothing in the whole range of dramatic literature can excel this . . . in psychological interest." Thus the apparent failure of Lear to suffer physically from the storm, is a piece of remarkable psychological import Lear says,

When the mind's free,
The body's delicate; the tempest in my mind
Doth from my senses take all feeling else,
Save what beats there.

To this Dr. Kellogg says, "It is a well-known fact, that, when the mind is swayed by intense emotions, the sensibility even to intense bodily pain is often completely suspended. The physical endurance manifested by the insane . . . is truly astonishing." And Dr. Bucknill of the same opinion remarks, "In the excitement of insanity physical injury is not perceived for the same reason that a wound is not felt in the heat of battle."

The ingratitude of Lear's daughters worming its way into his mind with the persistency of an augur, also gives rise to points of interest. Coleridge considers the end of this scene as the beginning of Lear's insanity for he says, "This scene ends with the first symptoms of positive derangement."[9] To which Dr. Bucknill says in disagreement: "Hardly so; it is but the climax of the disease. . . . The malady which has existed from the first, has increased and developed, until it is now completed."

In this scene, too, Lear suffers from delusion, a sure evidence of insanity. He says to Edgar, "Hast thou too given all to thy daughters." To which Dr. Kellogg says:

> How beautifully true all this is to nature, those who are at all acquainted with insanity can furnish ample testimony; as also, how admirably the genuine disease contrasts with the counterfeit, with which it is here brought in contact. Edgar's assumed madness presents a fine contrast to the reality of Lear's (for) it has the fault, which to this day feigning maniacs almost invariably commit, of extreme exaggeration.

To the following incident of the trial of Regan and Goneril impersonated in the mind of Lear by the two stools, Dr. Kellogg has this to say, "Scenes quite as ludicrous as the one set forth above are of daily occurrence in the wards of all extensive establishments for the insane. . . . " What a compliment to that man Shakespeare.

Dr. Bucknill cites many more points of psychological interest in this play. Thus he mentions the apparent physical vigor of Lear holding that "this state of hale bodily strength in senile mania is true to nature." He mentions the presence of all the factors of insanity in Lear, "exaggerated passion, perverted affection, weakened judgment, incoherence and delusion." He points out the tranquility of Lear when among the insane as an evidence of Shakespeare's remarkable knowledge of pathological psychology. This is contrary to the opinion of Ulrici and others. Dr. Bucknill says, "The singular and undoubted fact was probably unknown to Ulrici that few things tranquilize the insane more than the companionship of the insane. There is little, indeed, which, in the features of madness, Shakespeare allowed to escape his observation."

Hamlet, too, offers us a wealth of evidence of Shakespeare's astounding ability at delineating the abnormal states of mind. Here again critics only disagree in interpretation. That the play "Hamlet" is one of the most remarkable and true psychiatric studies, these critics do not disagree. Briefly stated there are four main medical interpretations of the character of Hamlet: (1) that the character of Hamlet represents a true feigned madness, (2) that it represents a combination of feigned madness and actual madness, (3) that the character is a remarkable illustration of Shakespeare's ability to portray a real form of insanity and (4) that the character represents a true example of an unresolved Oedipus complex.

The first interpretation is held by practically all literary critics not special students of psychological pathology. To this group belong Johnson, Schlegel, Goethe, Hallam and many others. We are not concerned with these.

The second interpretation is held mainly by Dr. J. C. Bucknill, probably the most important medical critic on Shakespeare. He says this of Shakespeare's ability to portray such a character:

> The feint is so close to nature, and there is underlying it withal so undeniable a substratum of morbid feeling, that in spite of ourselves, in opposition to our full knowledge that in his antic disposition Hamlet is putting on a part, we cannot dispossess ourselves of the idea . . . that a mind fallen is presented to us. (And again) How exquisitely is here portrayed the state of the reasoning melancholiac.

The third interpretation, and by far the most plausible, is advanced by Dr. A. O. Kellogg and adhered to by most psychiatrists, Dr. Brigham, Dr. Ray, Dr. Connolly, and others. These consider the case of Hamlet as a genuine case of melancholic madness, a psychoneurosis. Dr. Kellogg says:

> Such a case he has given us in the character of Hamlet, with a fidelity to nature which continues more and more to excite our wonder . . . the delineation being so true to nature that those who are at all acquainted with this intricate disease are fully convinced that Hamlet represents faithfully a phase of genuine melancholic madness.

Dr. Kellogg waxes so enthusiastic of Shakespeare's abilities in this direction that he no doubt allows his idolatry to run away with his reason for he says:

> Such are the varied phases of madness (portrayed) and how wonderful is that power of observation in our great dramatist, which has enabled him to draw them so minutely and accurately. His knowledge of the human heart and mind, under all circumstances and in all forms, whether of health or disease, is so accurate that he never makes a mistake . . .

Of the last interpretation of Hamlet as an example of an unresolved Oedipus complex, little can be said. It only serves to show how true to nature Shakespeare wrote. The Freudian concepts are an interpretation of the human mind, possibly a true interpretation. The development of Hamlet has been shown to be in accord with this interpretation. Thus Ernst Jones, the leader of the psychoanalysis movement in Great Britain, Ella Sharp, Norman J. Symons, and others, all consider an unresolved Oedipus complex as the fundamental problem of "Hamlet."

There are many more points of psychological interest, as showing the amazing knowledge of Shakespeare in delineations of madness. There is Macbeth, and Othello, and Ophelia and Jaques and numerous others. We believe, however, that we have thoroughly enough indicated the attitude of critical opinion on this subject.

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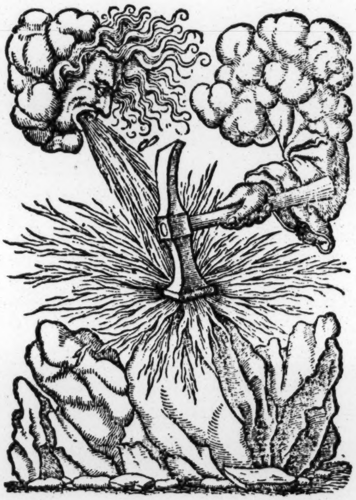

MEDICAL ALLUSIONS IN DON QUIXOTE

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WHATEVER is extravagantly praised is apt to suffer from its reputation. The beauties of Nature, great pictures, great books, great men are all handicapped by the too great expectations which their fame has aroused in us. If we are not struck dumb by the supernatural wonder of them we are apt, trying to see too much, to miss the much that is there and leave them with a feeling only of disappointment. For this reason it is a good thing if we can fool ourselves out of our expectations and approach them casually as we would anything else less celebrated. If I go out to enjoy the sunset I am pretty sure to be disappointed, but if at the end of a hard day's fishing my walk home leads me into the face of one, it is a different thing. Thinking perhaps of the fish behind or the camp ahead, my guard is down, I have forgotten about sunsets, and what they may or may not be, and can view this one as innocently and wonderingly as did Adam that first one on the evening of creation. It is simply a sunset and a very marvelous thing.

In reading great books I have need to distract myself from the thought, so that I can be satisfied to wade through the dull pages that are in all of them and not miss the good ones in looking for some still better. There are many dull pages in Don Quixote, a great many of them right at the beginning, and had I not hit upon the idea of looking for medical allusions I might never have finished the first volume, and might have been in no frame of mind to be surprised by the great passages or to make a natural acquaintance with the gentlest of all knights and the simplest of all squires.

"The Life and Achievements of the Renowned Don Quixote de la Mancha" was written in the latter part of his life by Miguel de Cervantes, a Spaniard, who was born October 9, 1547. The son of a practicing surgeon, he received sufficient education to acquire a judicious contempt for scholars, and universities, and spent his life fighting against the Moors (by whom for several years he was held captive) and in writing poems, dramas and novels. At the battle of Lepanto he lost his left hand, "a trifling price to pay," he wrote, "for the honor of partaking in the first great action in which the naval supremacy of the Ottoman was successfully disputed by Christian arms." His biographer says of the affair, "Although his hand had been cut off close by the wrist, the whole of the arm remained ever after quite stiff and useless, partly, it is probable, in consequence of the unskillfullness of the physicians who attended on him." He spent most of his life in the miserable rôle of an unsuccessful man of letters, for fame and wealth came to him only after the publication of Don Quixote and this was in his fifty-seventh year and but twelve years before his death. He died on April 18, 1616. Shakespeare died on the twenty-third of the same month.

We are fortunate in having in his own words an account of his last illness.

> We drew up a little . . . and rode on at a measured pace; and as we rode there was much talk about my illness. The good student knocked away all my hopes by telling me my disease was the dropsy and that I could not cure it by drinking all the water in the ocean. "Be charry of drinking, Senor Cervantes," said he, "but eat and eat plentifully for that is the only medicine that will do you any good." I replied that many had told me the same story; but that as for giving over drinking they might as well desire a man to give up the sole purpose of his being. My pulse, I said, was becoming daily more and more feeble, and that if it continued to decline as it had been doing, I scarcely expected to outlive next Sunday; so that I feared there was but little chance of my being able to profit much further by the acquaintance that had so fortunately been made.

He died a few days later as he predicted and as one might have expected since he persisted in treating his dropsy by riding horse-back and drinking water.

The book, because it has contributed an adjective to every language in the world, is more known than it is read. This is unfortunate for it is an excellent book. At the risk of insulting those who have read it, I will say that it is the story of a lunatic and a simpleton. The former, Don Quixote, an elderly scholar and squire, having over read on an indigestible mass of romantic literature, felt urged to revive the order of knight errantry. The latter, Sancho Panza, encouraged by the promise of a kingdom or an island or a dukedom was encouraged to go with him as his squire. And so the knight, armed *cap a pie* in a suit of ancestral armor and mounted on the decrepit Rozinante and with his brain buzzing with the ardor of knight errantry; and the squire, armed only in a great faith in his master and mounted on Dapple, his donkey, set out in quest of adventure. This they found, and although Don Quixote was fond enough to set his lance at windmills and flocks of sheep and caravans of peaceful travelers, which he mistook for giants and armies and such like, he proved himself as well one of the wisest and gentlest knights of whom there is record; and although Sancho was a great fool and simpleton he proved to have in him an abundance of homely wit and unlettered wisdom.

Knight errantry is a hazardous profession and one filled with hardships and extreme occasions. Surely in a true story of it there should be much of injuries and illnesses and much of their treatment. On reading the book we find this to be the case. How hazardous and hardy was the profession cannot be better stated than in the words of the author who tells us in the beginning that Don Quixote on this very account was almost persuaded from adopting it, saying, "He did not so well like those dreadful wounds which Don Belianis gave and received, for he considered that all of the art of surgery could never secure his face and body from being strangely disfigured with scars." In the excitement of setting off on his adventures the knight seems to have forgotten these things, for he started with no preparation against them and had to be reminded by the keeper of the inn at which he and Sancho put up over the first night. This understanding gentleman said to him, "And you may rest assured that all the knights errant of whom so many histories are full carried also with them a small box of salves to heal their wounds; for they had not the conveniency of surgeons to cure them every time they fought in the fields and the deserts."

It was not long before Don Quixote was persuaded of the wisdom of this advice and there were few days thereafter that it was not impressed upon him. Before the end of his wanderings he was so impressed with it that he put it down as one of the chief qualifications of a knight errant that he be "skilled in physic, especially in the botanic part of it, that he may know the nature of simples and have recourse to those herbs that can cure wounds; for the knight errant must not expect to find surgeons in the woods and deserts." He also spent much time in looking for and preparing a magic elixir that would simplify the treatment of all these inconveniences. We shall speak more of that later.

The great Sydenham, on being asked by a medical student with what book he could best begin his professional reading, replied, "Don Quixote, Sir!," and left the student to make of it what he could. There is no doubt but that both Sydenham and Cervantes are honored by this remark; and while some may see in it an expression of Sydenham's distrust of medical texts and his faith in broad culture and a clear understanding, there is some reason to believe that he was in earnest.

In the introduction Cervantes speaks at length on the subject of writing. In those days there was an overabundance of books and writing, medical, I am sure, as well as lay, and authors had the peculiar vanity of wishing to appear learned. To this end they made legion references to other writers and there were many who felt that if they could at the end string out an interminable bibliography, their work need have nothing else to recommend it. On these ancient abuses he writes as follows: "For I am not ignorant of the temptations of Satan, and of all his imps the scribbling demon is the most irresistable. When that Demon has got into a man's head, he takes the possession for inspiration, and, full of his false ability, falls slap dash to writing and publishing." Once when he was sweating over his preface to the book, a friend dropped in and asked him what was bothering him so. He replied that he was puzzling his brain over a preface to Don Quixote and had about decided to give up the whole business, for, he said:

> Why should I expose myself to the lash of the old legislator, the vulgar? They will say I have spent my youthful days very finely to have nothing to recommend my grey hairs to the world but a dry insipid legend without either quotations in the margin or annotations at the end, which other books, though never so fabulous or profane, have to set them off. Other authors can pass upon the public by stuffing their books from Aristotle and Plato and the whole company of ancient philosophers, thus amusing their readers into a great opinion of their prodigious reading. Now I want all these embellishments and graces; I have neither marginal notes nor critical remarks; I do not so much as know what authors I follow, and consequently can have no formal index, as it is the fashion now, methodically strung on the letters of the alphabet, beginning with Aristotle and ending with Xenophon or Zoilus or Zeuxis, which last two are commonly

> crammed into the same pica, though one of them was a famous painter and the other a saucy critic.
>
> In short, my friend, the great Don Quixote may lie buried in the dusty records of la Mancha until Providence has ordered some better hand to fit him out as he ought to be; for I must own myself altogether incapable of the task. Besides I am naturally lazy and love my ease too well to take the pains of turning over for those things I can explain as well without it.

His friend was surprised that he should be balked by such trifling obstacles. Said he:

> As to the marginal notes and quotations from authors for your history, it is but dropping here and there some scattered Latin sentences that you have already by rote, or may have with little or no pains. For example, in treating of liberty and slavery, clap me in, "Non bene pro toto libertas venditur auro," and at the same time make Horace or some other author vouch it in the margin. . . . These scraps of Latin will at least gain you the credit of a great grammarian, which, I'll assure you is no small accomplishment in this age. As to annotations or remarks at the end of your book, you may safely take this course. . . . In short it is but quoting these authors in your book, and let me alone to make large annotations. I'll engage to crowd your margin sufficiently, and scribble you four or five sheets to put at the end of your book; and for the citation of so many authors, it is the easiest thing in nature. Find out one of those books with an alphabetical index, and without any further ceremony, remove it verbatim into your own; and though the world won't believe you have occasion for such lumber, yet there are fools enough to thus be drawn into an opinion of the work. At least such a flourishing train of attendants will give your book a fashionable air, and recommend it for sale; for few chapmen will stand to examine it, and compare the authorities upon the counter, since they can expect nothing but their labor for their pains.

At a certain place the Don meets up with a scholar who says:

> Another work which I soon design for the press, I call a supplement to Polydore Vergil, concerning the invention of things; a piece I will assure you, sir, that shows the great pains and learning of the compiler, and perhaps in a better style than the old author. For example he has forgot to tell us who was the first that was troubled with a catarrh in the world; and who was the first that was fluxed for the French disease. Now, sir, I immediately resolve it, and confirm my assertation by the testimony of at least four and twenty authentic writers; by which quotations alone, sir, you may guess at what pains I have been to instruct and benefit the public.
>
> Sancho having hearkened with great attention all this while, "Pray, sir," quoth he to him, "so heaven guide your right hand in all you write, let me ask you who was the first man that scratched his head."

Mankind still yearns for a cure-all. Impatient with the uncertainties and failures of medical science, they have now, and surely have always had, in their mind's eye a vision of some elixir, some golden liquid which would heal all wounds, and cure all diseases. Since so urgent a demand creates always a supply, we have one or more of them perpetually with us. And since, too, most diseases are self-limited and many others, being imaginary, will be cured by anything in which the sufferer has sufficient faith, and since many of the others can be cured by no man, not even the doctor, these remedies have no hard time in acquiring a certain fame and following. Lately we had homeopathy. Today we have Christian Science, Chiropractic, Abrams and many another. Too great expectation begets them and kills them and none of them lives more than a generation or two.

Don Quixote had the formula for such an elixir, "one drop of which would heal all wounds as perfectly as if they had never been made." As he and Sancho went on day after day suffering beatings and whackings, cracked pates and stove-in ribs, their need for some such fluid became truly acute. Although, as we shall see later, they were subjected to many homely remedies, they felt that a balsam of this kind would make knight errantry a less dangerous and uncomfortable profession.

After the battle with the Biscayner, in which quixotic arms were completely victorious, but in which he had his ear cut off, he complains to Sancho, who was dressing it, saying:

> "How needless would all this have been had I but bethought myself of making a small bottle of the balsam of Fierabras, a single drop of which would have spared us a great deal of time and medicaments." "What is that balsam, if it please you?" quoth Sancho. "A balsam," answered Don Quixote, "of which I have the receipt in my head; he that hath some of it may defy death itself and dally with all manner of wounds; therefore when I have made some of it, and given it thee, if at any time thou happenest to see my body cut in two, by some unlucky backstroke, as it is common among us knights errant, thou has no more to do but to take up nicely that half which has fallen to the ground and clap it exactly to the other half on the saddle, before the blood is congealed, always taking care to lay it precisely in its proper place; then thou shalt give me two drops of that balsam, and thou shalt immediately see me become whole and sound as an apple."

Sancho, much to the distress of his master, had a marked practical turn and an eye always to his pocket book. Seeing immediately the possibilities in such a medicine, he answered:

> "If this be true, I will quit you about your promise of the island this minute of an hour, and will have nothing of your worship for what service I have done, and am to do you, but the receipt of this same balsam, for I dare say, let me go wherever I will, it will be sure to yield me three good reals an ounce; and thus I shall make shift to pick a pretty good livelihood out of it."
>
> "Say no more," returned Don Quixote, "but in the meantime dress my ear, for it pains me more than I could wish."

His ear was eventually healed by some shepherds who treated it with a dressing of leaves of rosemary and salt so that the next morning it was quite well and free from pain.

It was not until several times more they had lamented the lack of it that finally the Don came actually to making the balsam. After the drubbing in the inn, lying again unable to move, he said to Sancho, "But, pray rise, Sancho, if thou canst, and desire the governor of the castle to send me some oil, salt, wine and rosemary, that I may make my healing balsam; for I truly want it extremely, so fast the blood flows out of the wounds which the phantom gave me just now."

Sancho, who had received a drubbing only less severe than his master's, hobbled off and presently came back with the desired ingredients. These his master mixed together in a pot and put over the fire until he thought they had boiled sufficiently.

Then he mumbled over the pot above four score Paternosters and as many Ave Marias, Salve Reginas, and Credos, making the sign of the cross at every word by way of benediction. . . . This blessed medicine being made, Don Quixote resolved to make an immediate experiment of it upon himself; and to that purpose he took off a draught of the overplus; but he had scarce gulped it down than it set him to vomiting so violently that you would have thought he would cast up his heart, liver and guts. [After this he slept for about three hours and on waking] felt so wonderfully eased but he made no question but he had now the right balsam of Fierabras.

Sancho, encouraged by the wonderful effect of the balsam on his master, begged leave to sip what was left in the pot, which was no small quantity; and the Don having consented, honest Sancho lifted it up with both his hands and with a strong faith and better will poured every drop down his throat. Now the man's stomach not being so nice as his master's, the drench did not set him a vomiting after that manner, but caused such rumbling in his stomach, such a bitter loathing, kicking and wretching, and such grinding pangs, with cold sweats and swoonings, that he verily believed his last hour was come, and in the midst of his agony gave both the balsam and him that made it to the devil. "Friend," said Don Quixote, seeing him in this condition, "I begin to think that all this pain befalls thee, only because thou hast not received the order of knighthood; for it is my opinion this balsam ought to be used by no man that is not a professed knight." "What a plague then did you mean by letting me drink it?" quoth Sancho. "A murrain on me and all my generation, why did you not tell me this before?" At length the dose began to work to some purpose and forced its way at both ends so copiously that both his bed mat and coverlet were soon made unfit for any further use; and all the while he strained so hard, that not only himself, but the standers by, thought he would have died. This dreadful hurricane lasted about two hours, and then, too, instead of finding himself as free from pain as his master, he felt himself so feeble and so far spent that he was not able to stand.

The elixir was not wholly a success. Don Quixote tried it once more but with as poor results as Sancho experienced from his first dose. Thereafter neither he nor Sancho said a word about it. When they were bruised or mauled or wounded, they put up with more homely, but less drastic remedies, and with the help of these managed to come through all of their adventures and to die peacefully in their beds.

The treatment they received for their injuries was not much different from that which we would advise today and certainly was the same that any practical housewife would unhesitatingly administer without consulting a physician. They had with them salves and lint for dressing their wounds and after their worse drubbings some good Samaritan usually happened along to help them. Thus in the inn Maritornes and the hostess anointed and plastered them all over. Sancho, standing by and seeing the oil expended so freely on his master, said, "I beseech thee, save some of that tow and ointment for me too, for I don't know what is the matter with my back, but I fancy I stand mainly in need of a little greasing, too."

We have already seen that Don Quixote had great faith in herbs and simples and that he advised all entering the profession to become acquainted with their use. We are not told what these were specifically, but we can imagine that they were many and strange. The still prevalent faith in therapeusis is well expressed by Sancho, who says, "Well, there is a remedy for all things but death, which will be sure to lay us flat one time or another."

The Don had a more sensible view of the matter and realized that a diagnosis must precede the treatment. Speaking to Signor Roque, he says:

> "Signor Roque, it is a great step to health for a man to understand his distemper, and the compliance of the patient to the rules of physic is reckoned half the cure. You appear sensible of the malady, and therefore may reasonably expect a remedy, though your disease, being fixed by a long inveteracy, must subject you to a tedious course. The Almighty Physician will apply effectual medicines."

There is something in this of the attitude of the therapeutic nihilists, this trusting to the almighty physician. There is much more of the same thing in the curate who said, "Heaven mend them! In the mean time let us observe them." Sancho admitted that his addiction to quoting proverbs was a disease which "heaven alone could cure." That even greater wisdom was in him is evidenced by the following remark where he gives credit where credit is due and lays down a therapeutic principle worthy of the Aphorisms. "The rest we will leave to Time," he says, "which is the best doctor in such cases, nay, in worse diseases."

Master Carrasco, having been unhorsed and generally discomfitted by a charge of the Don's managed to get to a town, "where by good fortune they met with a bone setter." The barber from whom the knight wrested Mambrino's helmet was on his way to a neighboring village to shave and let blood. Don Quixote tells Sancho that he is of a sanguine complexion and that losing a little blood will do him no harm. The idea of blood transfusion was then popular, as it has been always. There is mention of men tipping up bottles and transfusing blood and spirit of the vessels into their stomachs. That there was knowledge of an anticoagulant for blood is evidenced by the statement that the artful lover at Comancho's feast had hidden beneath his coat a flask of blood, "artfully prepared so that it would not congeal." Enemata and emetics were certainly in common use, for the author says, "many important principles of prudence and morality have been learnt from irrational creatures; as, the use of clysters from the stork, and the benefit of vomiting from the dog." The Don recognized the power of diversion to allay pain, for he said to Sancho, "I durst lay a wager that now thou art suffered to prate without interruption thou feelest no manner of pain in thy whole body." It is stated that the knight "hung his trusty sword by his side in a belt of sea-wolf's skin; which makes many of the opinion that he had been long troubled with a pain in his kidneys." When Lucinda fainted they laid her on a couch, sprinkled water in her face and loosened her stays, to give her more room to breathe.

While he was Governor of the Island Sancho was dieted to exasperation. When he objected, the physician, who was standing at his elbow, said:

> "I am a doctor of physic, my lord, and have a salary allowed me in this island for taking care of the governor's health, and I am more careful of it than of my own, studying night and day his constitution, that I may know what to prescribe when he falls sick. Now, the chief thing I do is to attend him always at his meals, to let him eat what I think convenient for him and to prevent his eating what I imagine to be prejudicial to his health, and offensive to his stomach. Therefore, I now ordered the fruit to be taken away because it is too cold and moist; and the other dish, because it is as much too hot, and over seasoned with spices, which are apt to increase thirst; and he that drinks too much, destroys and consumes the radical moisture, which is the fuel of life." "So then," quoth Sancho, "this dish of roasted partridges here can do me no manner of harm." "Hold," said the physician, "The Lord Governor shall not eat of them while I have life to prevent it." "Why so?" cried Sancho. "Because," answered the doctor, "our great master, Hippocrates, the north star and luminary of physic, says, in one of his aphorisms, *Omnis saturatia mala, perdicis autem pessima;* that is, 'All repletion is bad, but that of partridges is worst of all.'"

When Sancho suggested that a pudding might be all right:

> "Absit," cried the doctor, "far be such an ill thought from us. Leave that luxurious compound to your rich monks and prebendaries, your masters of colleges and lusty feeders at country weddings; but let them not encumber the tables of governors, where nothing but delicate unmixed viands, in their prime, ought to make their appearance. The reason is that simple medicines are generally allowed to be better than compounds; for, in a composition, there may happen a mistake, by the unequal proportion of the ingredients; but simples are not subject to that accident."

Finally, Sancho, in a mighty chafe, said:

> "Hark, you, Mr. Doctor Pedro Rezio de Aguero, . . . take youself away. Avoid the room this moment, or, by the sun's light, I'll get me a good cudgel, and beginning with your carcase, will so belabor and rib-roast all the physic mongers in the island, that I will not leave therein one of the tribe of those, I mean, that are ignorant quacks; for, as for learned and wise physicians, I will make much of them, and honor them like so many angels. Once, more, Pedro Rezio, I say, get out of my presence. Avaunt! or I will take the chair I sit upon and comb your head with it to some purpose, and let me be called to account for it when I give up my office; I do not care, I will clear myself by saying I did the World good service in ridding it of a bad physician, the plague of a commonwealth."

In the course of the work a number of injuries and diseases are specifically mentioned or described, in sufficient detail to be recognized. The first of these, save of course for knocks and contusions too numerous to mention, occurred during the encounter with the Biscayner. Don Quixote "discharged such a tremendous blow full on his cushion and his head, that in spite of so good a defense, as if a whole montain had fallen upon him, the blood gushed out of his mouth, nose, and ears all at once." It is obvious that his skull was badly fractured. The Don and Sancho, while it is a wonder that they did not suffer frequently the same fate, came off with nothing worse than concussions. They were exceedingly tolerant of huge blows and terrific hammerings. Like the men in the comics, under the worst of them they would reel and lie unconscious, but were soon up and talking it over and soon off in quest of more.

There are many instances of cracking and bruising of ribs, of jamming the short ribs into the abdomen, and two instances of penetrating wounds of the thorax. The first of these occurred at Comancho's wedding feast. The disappointed lover, having run himself through the chest with his sword, his friends rushed up and "would have pulled it out of his body, but the curate urged it was not convenient until he had made confession, and prepared himself for death, which would immediately attend the effusion of blood upon pulling the tuck out of his body." That such is the result of unstopping wounds of the heart or those that have injured large vessels is well known. In the Iliad there is a similar instance and another in Mathew Arnold's "Sohrab and Rustum."

On another occasion a gentleman so incurred the displeasure of a lady who was riding behind him on his horse that she took "a great pin, or rather, as I am apt to believe, a bodkin, out of her case and ran it into his back. My lady returned home afoot and the gentleman rushed off to a surgeon complaining that he was pricked through the lungs."

On the occasion of the stoning by the shepherds Sancho was solicitous lest it was his master's heart's blood that was being vomited into his face. A knowledge of the physiology of expiration and the accident of interstitial emphysema is suggested in the statement that "Sancho tore his very lungs for halloaing." And in Don Quixote's account of the life of a soldier he says, "He has nothing to cherish him against the harshness of the season but the breath of his mouth, which, issuing from an empty place, I am persuaded is itself cold, though contrary to the rules of nature." Aristotle, one recalls, believed that the expansion of the thorax was brought about by the heating of the inspired air by the heart.

One of Sancho's delightful characteristics was an intense relish of his food. He ate heartily and rapidly whenever the opportunity offered and much of the rest of the time was worrying lest the next meal be somehow put off. Don Quixote was impatient of this crude concern and said to him, "I was born, Sancho, to live dying, and thou to die eating." The rapidity with which the poor squire ate resulted in frequent postcibal belchings and eructations. These irritated his master, who said:

> "Eat little at dinner and less at supper, for thy stomach is the storehouse whence health is to be imparted to the whole body.
>
> "Be careful not to chew on both sides, that is, fill not thy mouth too full, and take heed not to eruct before company."
>
> "Eruct," quoth Sancho, "I do not understand that cramp word." "To eruct," answered Don Q, "is as much as to say, to belch; but this being one of the most disagreeable and beastly words in our language, though very expressive and significant, the more polite, instead of belching, say eructing, which is borrowed from the Latin."
>
> "Faith and troth," quoth Sancho, "of all your counsels I will be sure not to forget this, for I have been mightily given to belching."

The farmer's son who has the epilepsy and who his father thinks is therefore bewitched by the devil, is betrothed to a wench who, besides having a familial palsy, has lost one eye from the smallpox.

Donna Rodrigues, speaking to Don Quixote of the Duchess at whose castle he was being entertained, says:

> "Do you observe, sir, that beauty of my lady's, that softness, that clearness of complexion, smooth and shining, like a polished sword, those cheeks all milk and vermillion, fair like the moon and glorious like the sun, that air when she treads, as if she disdained to touch the ground, and, in short, that look of health that enlivens all her charms? Let me tell you, sir, she may thank heaven for it in the first place, and next to that, two issues in both her legs, which she keeps open to carry off ill humours, with which the physicians say her body abounds." "Blessed Virgin!" cried Don Q., "is it possible the duchess should have such drains! . . . Well, I am now persuaded such sluices may be of importance to health."

Today, three centuries later, there is still the fear of healing a chronic sore. Ideas are long-lived, and it is probable that many other popular conceptions of disease date back as far or further, and among the profession, also, I am sure, that there are many ideas as old which have nothing but their antiquity to recommend them.

Don Quixote says, "A spiteful enchanter persecutes me, hiding with mists and cataracts from me, and me alone, those peerless beauties."

When the knight and squire meet and attack the procession of monks bearing their dead brother, Sancho's teeth chatter as if he had been in an ague fit; and when he asked who killed the monk, he was told, "Heaven with a pestilential fever."

Donna Rodriguez, making love to Don Quixote, apologizes for her advanced years, saying, "I have good flesh still about me and all my teeth still in my head, except some few which the rheums so rife in this country of Aragon have robbed me of."

One of the convicts whom the knight rescues from his guards and who later joins with his fellows in attacking his liberator, says of himself, "Stooping as I do under the heavy burden of old age, and being grievously afflicted with the strangury which scarce affords me a moment's respite from pain." Mindful perhaps of this picture of old age, he cites Julius Caesar who, "being asked what kind of death was best, said, 'That which is sudden and unexpected.'" Don Quixote added, "And though his answer had a relish of paganism, yet, with respect to human infirmities, it was very judicious."

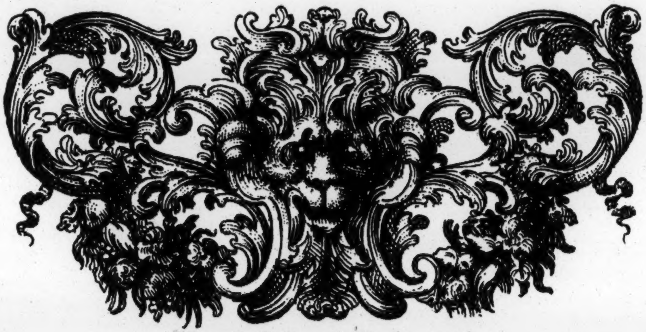
There are occasional passages which show that digs at the doctors are not new, or their causes either. Sancho says, "A doctor gives his advice by the pulse of your pocket." When he had been pinched and pricked beyond his endurance to effect the resurrection of Altisadora, who then refused him the smocks she had promised him, he said:

> "Faith and troth, sir, I have the worst luck of any physician under the cope of heaven; other doctors kill their patients and are paid for it too, and yet they are at no further trouble than scrawling two or three cramp words for some physical slip-slop which the apothecaries are at all the pains to put up. Now here am I, that save people from the grave at the expense of my own hide, and yet the devil a cross I get by the bargain. But if ever they catch me a-curing anybody in this fashion, unless I have my fee before hand, may I be served as I have

been, for nothing. Odds diggers! they shall pay sauce for it; no money, no cure; the monk lives by his singing; and I cannot think heaven would make me a doctor without allowing me my fees."

A peasant whom Sancho met by the roadside said to him, "I am a widower because my wife is dead. She died, if it please you, or, to speak more truly, she was killed by a damned doctor who gave her a purge when she was with child." Even then, as Don Quixote would say, "Not all things were blessed with a favourable event"; and, justly or unjustly, the doctor was occasionally blamed.

As I have said before, in spite of his many adventures Don Quixote came finally to die peacefully in his bed. The fever of his last illness drove away his madness, a fact from which today some might argue that he suffered from general paresis. "A physician was sent for, who, upon feeling his pulse, did not very well like it." After this he asked them to leave him that he might sleep. When he awakened his mind was again clear, and like the gentle and wise man he had always been, he asked forgiveness for his follies and prepared himself for death, which followed shortly.



[From Redi: Sonetti, Firenze, 1702.]

THE MEDICAL WISDOM OF BRET HARTE

By LOUIS J. BRAGMAN, M.D.

SYRACUSE, N. Y.

The Pharmacist

BRET HARTE was born in Albany, N. Y., in 1836, and as a youth left for the Western coast to seek his fortune. He was only nineteen, when, like his famed successor, O. Henry, he obtained a position as a drug clerk in Oakland, and later, in Union, Calif. These dispensing days, says Pemberton, his biographer, peep out in many of his stories, especially in "How Reuben Allen Saw Life in San Francisco."

Here, it would seem, Harte becomes the junior partner of the apothecary firm of Sparlow and Kane. The senior member often leaves the young druggist in charge of the surgery and its adjuncts. For this responsible position, these are his chief qualifications:

> A slight knowledge of Latin as a written language, an American schoolboy's acquaintance with chemistry and natural philosophy, were deemed sufficient by his partner, a regular physician, for practical cooperation in the vending of drugs and putting up of prescriptions. He knew the difference between acids and alkalies and the peculiar results which attended their incautious combination. But he was excessively deliberate, painstaking and cautious. The legend which adorned the desk at the counter, "physicians prescriptions carefully compounded," was more than usually true as regards the adverb. There was no danger of his poisoning anybody through haste or carelessness, but it was possible that an urgent "case" might have succumbed to the disease while he was putting up the remedy. In those days the "heroic" practice of medicine was in keeping with the abnormal development of the country; there were "record" doses of calomel and quinine, and he had once or twice incurred the fury of local practitioners by sending back their prescriptions with a modest query.

Healing Waters

A knowledge of the beneficent value of arsenic was most likely acquired behind the drug counter, for he accordingly makes the therapeutic and restorative qualities of arsenical water the basis for one of his best-known romances.

The leading character of "Liberty Jones's Discovery," unluckily endowed with a "yaller" face, was, in addition, thin and bony, with "a lank frame that outstripped the body of her ragged calico dress." Her only notable feature was a pair of large dark eyes, which, however, looked all the larger because of their setting in the hollow temples.

Accidently chancing upon a hidden spring, and partaking daily of its water, this victim of chlorosis within two months developed into a beautiful girl, with well-rounded limbs, rosy cheeks, lustrous eyes and glossy hair.

Suddenly she left off drinking the water, and promptly became dangerously ill. Her employer, Dr. Ruysdael, who had a lucrative practice in San José, was advised as follows by the specialist with whom he had consulted:

"Of course there is no doubt that the symptoms all point to slow arsenical poisoning. Young ladies take arsenic in minute doses to improve the complexion and promote tissue, forgetting that the effects are cumulative when they stop suddenly."

Her permanent restoration was effected when she resumed her daily consumption of the precious liquid.

A contribution by Harte to the *Overland Monthly* further elaborates the theme of healing waters:

> There are more than 5000 Springs in the Coast Range. How many there are in other parts of California we cannot estimate, for our spas have yet to be written up. Oral tradition gives a glowing but vague account of their peculiar and wonderful virtues. We all know some man who knew another man, who, after having been given over by the faculty, was cured by two baths in the Scalding Spring, the Lukewarm Spring, or the Spring of Abominable Odours. We all know the familiar Thompsonian Springs of San Andreas, where Nature offers boiling pennyroyal tea and boneset to the exhausted invalid, and the Compound Cathartic Spring, of San Antonio, whose waters, impregnated with magnesia, percolating a plantation of rhubarb, are so famous; but we want details.

Accompanying this instructive comment, is a poem entitled "The Arsenical Spring of San Joaquin." Following its fortunate discovery, and the subsequent free imbibition,

> Not in the eyes of Faith alone,
> The good effects of the water shone,
> But skins waxed rosy, eyes grew clear,
> Of rough vacquero and muleteer.
> Angular forms were rounded out,
> Limbs grew supple and waists grew stout.

But, as in the case of Liberty Jones, abstention proved disastrous:

> None went abroad to roam or stay,
> But they fell sick in the queerest way—
> A singular sort of *malade du pays*
> With gastric symptoms . . .

Which impelled the author to this fitting moral:

> You see the point? Don't be too quick
> To break bad habits—better stick
> Like the Mission folk, to your arsenic.

DR. DUCHESNE

Bret Harte has left behind, fragmentarily, in fourteen of his Western tales, a portrait of a genuinely lovable type of pioneer physician. Dr. Duchesne, who plays a sympathetic, fatherly rôle, is an ex-army doctor, a practitioner of wide and diversified accomplishments. He is revealed as a man of plain speech, frank, fearless, skillful, and popular, and of "a naturally refined nature and liberal education."

More than a mere local reputation has accrued to him, for he had been established on various occasions in different towns and mining camps of California. He is first seen as the resident physician of Smith's Pocket, where he suspects "M'liss" in connection with her father's untimely death. In "The Man on the Beach" he attends a baby, and an adult who is a victim of "inflammation of the lungs." By his courage, presence of mind, and knowledge of human nature, he saves the lives of two patients in "The Twins of Table Mountain." His gentle hands administer welcome relief to poor Slinn, the pathetic paralytic, in "The Millionaire of Rough and Ready."

A forceful example of his dauntless surgical skill is given in "The Chatelaine of Burnt Ridge." A head fracture, resulting from a fall, necessitates a decompression operation, with silver plating. The only available surgical amphitheater is a room in a farmhouse.

> There's a piece of bone pressing on the brain no bigger than that, but as much

as if all Burnt Ridge was on top of him. I'm going to lift it. I want somebody to stand by, some one who can lend a hand with a sponge—some one who isn't going to faint or scream, or even shake a hair's breadth.

To this grim plea of Dr. Duchesne a woman responds. And although the details of what follows are not given, we are told that his assistant, after it was all over,

> . . . regarded with curiosity the ostentatious solicitude with which the doctor seemed to be wiping his fateful instruments that bore an odd resemblance to a silver-handled centre-bit. The sterterous breathing below the bandages had given away to a fainter but more natural respiration. There was a moment of suspense. The doctor's hand left the pulse and lifted the closed eyelid of the sufferer. A slight movement passed over the figure. The sluggish face had cleared: life seemed to struggle back into it before even the dull eyes participated in the glow.

After a number of days, when the patient had lapsed into a "semi-idiotic state," the doctor "confessed his professional disappointment at the incomplete results of the operation. He had saved the man's life, but as yet not his reason." So he decided he would remove him to the county hospital as soon as possible, to give him the benefit of the latest science and the best specialists.

Unfortunately, an epileptic seizure made the doctor feel that some irritation of the brain persisted, "which would indicate that there was still some physical pressure or obstruction there—in which case he would be subject to these attacks all his life." And finally a prolonged spell, followed by marked exhaustion, terminated his sad career.

The surgical skill of Dr. Duchesne is further instanced in "Cressy," where he extracts a bullet from the hip:

"It was a mighty close shave between a shattered bone and a severed artery, but we've got the ball, and he'll pull through in a week."

In the same tale some quaint medical phrases are introduced, such as "blind chills, innerd rash, palsy creeps, and marsh fever," in which latter case "the germs are caught from an adjacent river." And in another part of the story, a child instinctively renders himself first-aid treatment for a flesh wound of the leg:

> With a vague recollection of a certain poultice applied to a bone on his father's neck, he collected a quantity of dried *yerba buena* leaves, and with the aid of his check apron and one of his torn suspenders tightly wound round the whole mass, achieved a bandage of such elephantine proportions that he could scarcely move with it.

Yerba buena, according to botanical lore, is Spanish for "good herb," a species of mentha valuable as a *tisane* or fermentation.

In "The Transformation of Buckeye Camp," the doctor was amused at an old frontiersman superstition to the effect that men who were injured by gunshot wounds swallowed the extracted bullets, under the belief that by so doing, inflammation and other possible supervening complications could be forestalled.

He shows his insight into psychology in "A Convert of the Missions," where he brings about a complete recovery in the case of a minister who was suffering from excessive and repeated excitation of the nervous system, with depression following the prolonged artificial excitement.

"In the Tules" tells of a case of "tule" fever which was treated by Dr. Duchesne. The name refers to a reed-like grass spreading over marshy districts, undue exposure to which produces certain unfavorable symptoms, starting with listless limbs and tired feet.

"At night this listlessness changed to active pain and a feverishness that seemed to impel him towards the fateful river, as if his one object in life was to drink up its waters and bathe in its yellow stream."

Strange visions assailed him, of dead and floating bodies, of dazzling lights of steamboats, and the glare of stony eyes. After a prolonged period of delirium, he wakes to find that his medical servant through the crisis was the faithful Dr. Duchesne.

In "See Yup" the doctor discusses the nature of Chinese medicine; in "The Youngest Prospector in Calaveras" he attends a patient in her last illness; in "Mr. Bilson's Housekeeper" he treats a case of fractured arm and collar-bone. He prepares for "The Convalescence of Jack Hamlin," who is recovering from an attack of "lung fever," by sending him to the house of an old friend, a woman whose two children he had brought into the world, and whom he had "skillfully attended through a long illness consequent upon the inefficient maternity of soulful but fragile American women of her type." And in "Gabriel Conroy," where he is surgeon to the relief party that visits Starvation Camp, he attends Hamlin, the noted gambler, on his death bed.

Thus, through the pen of Bret Harte, does Dr. Duchesne, whoever his prototype may have been, achieve recognition as the benevolent and unstinting bearer of the gospel of health and hope in the early days of the growing West.

CHINESE MEDICINE

The large Oriental population of California enabled Bret Harte to obtain first-hand knowledge of Chinese medicine. A typical practitioner is depicted in the person of Dr. Lipotai, the "slant-eyed Apollo," who was reputed to have made extraordinary cures upon thousands of American patients. With the aid of two interpreters, the ills of suffering San Francisco were translated to this medical oracle, who then dispensed the indicated medicine, usually in the form of small powders. Some of the specifics he employed were green tea for tuberculous troubles, sugar for aneurysm, and punk, which was smelled, for dropsy.

In "See Yup," a group of miners, in the throes of dyspepsia, turn to the Oriental healer for relief, on the principle that one rarely heard of a Chinaman suffering from that ailment. Later, asking Dr. Duchesne if he knew anything about their therapy, he bluntly told them:

"I don't know, and I don't know anybody who does. You see, the Chinese know nothing of anatomy from personal observation. Autopsies and dissection are against their superstition, which declares the human body sacred."

Their medicines, he added, were positively noxious, being the antithesis of simple or natural or rational compositions. And as for their mode of administration, according to Pessilia, another character:

"I gather that when he was permitted to dose the all-powerful 'Mellicans,' John was inclined to be a little malicious, and from his point of view, to match cunning with cunning."

When, finally, an eminent Chinese authority was prevailed upon to publish a list of remedies contained in the pharmacopeia, it was seen that most of them, intentionally or otherwise, were powerful emetics, a mere detailing of which would be enough to produce the ordinary symptoms of sea-sickness.

Some Other Doctors

An ex-soldier, in "The Man Whose Yoke Was Not Easy," is afflicted with a huge, pulsating aneurysm, caused, evidently, "by the buckle of his knapsack pressing upon the arch of the aorta." The doctor, under whose care he puts himself, is described in the following idealistic terms as:

> A man of broad culture and broader experience; a man who had devoted the greater part of his active life to the alleviation of sorrow and suffering; a man who had lived up to the noble vows of a noble profession; a man who locked in his heart the secrets of a hundred families, whose face was as kindly, whose touch was as gentle in the wards of the great public hospitals as it was besides the laced curtains of the dying Narcissa; a man who, day and night, was at the beck and call of Anguish; a man who never asked the creed, belief, moral or worldly standing of the sufferer, or even his ability to pay the few coins that enabled him (the physician) to exist and practice his calling; in brief, a man who so nearly lived up to the example of the great master that it seems strange I am writing of him as a doctor of medicine and not of divinity.

In "Sally Dows" a glimpse is given of another type of physician, who was caring for a victim of snake-bite and exposure in the swamps:

> The medical practitioner of Redlands he remembered was conservative, old-fashioned, and diplomatic. But his sympathies had been broadened by some army experiences, and Courtland trusted to some soldierly and frank exposition of the matter from him. Nevertheless, Dr. Maynard was first healer, and professionally cautious.

Dr. Richard Blair, in "Mr. MacGlowrie's Widow," heals an injured dog, and falls in love with his patient's mistress:

> Coming from a rude frontier practice, he had succeeded the district doctor in a more peaceful and domestic administration. A skillful and gentle surgeon, rather than a general household practitioner, he was at first coldly welcomed by the gloomy dyspeptics and ague-haunted settlers from riparian lowlands. The few bucolic idlers who had relieved the monotony of their lives by the stimulus of patent medicines and the exaltation of stomach bitters, also looked askance at him. A common sense way of dealing with their ailments did not naturally commend itself to the shopkeepers who vended these nostrums, and he was made to feel the opposition of their trade.

A less flattering type of physician is humorously hinted at in the poem "Love and Physic," in which a doctor calls upon a patient with an offer of marriage. His proposal is spurned, but

> Perhaps you think, 'twixt love and rage,
> He took some deadly potion,
> Or with his lancet breathed a vein
> To ease his pulse's motion.
> To guess the vent of his despair,
> The wisest one might miss it.
> He reached his office—then and there
> He charged her for the visit.

In "No Title," one of Harte's burlesque condensed novels, there is this amusing satire on medico-legal testimony:

> My name is David Diggs. I am a surgeon, living at No. 9 Tottenham Court. On the 15th of June, 1854, I was called to see an elderly man lodging on the Kent Road. Found him highly excited, with strong febrile symptoms, pulse 120, increasing. Repeated incoherently what I judged to be the popular form of a conundrum. On closer examination, found acute hydrocephalus, and both lobes of the brain rapidly filling with water. In consultation with an eminent phrenologist, it was further discovered that all the organs were more or less obliterated, except that of comparison. Hence the patient was enabled to only distinguish the most common points of resemblance between objects, without drawing upon other faculties, such as Ideality or Language, for assistance. Later in the day, found him sinking,—being unable to carry the most ordinary conundrum to a successful issue. Exhibited Tinct. Val., Ext. Opii, and Camphor, and prescribed quiet and emollients. On the 17th the patient was missing.

In another condensed novel, "Zut-Ski," in which a music-hall artist imagines herself a princess of ancient Egypt, Dr. Haustus Pilgrim, a noted London specialist in mental diseases, spends his holiday on the Nile, his *dahabiyeh* filled with a number of his patients. In "The Story of a Mine" a patient offers to his physician, Dr. Guild, a little flask of quicksilver in payment for a dose of mercury, thus giving a clue to the discovery of a valuable deposit of the mineral that serves equally industry and medicine.

That the author was observant of the ways of the profession is attested in "The Crusade of the Excelsior," where he speaks of an ecclesiastic who "lifted his hand with a soothing gesture—the movement of a physician who has just arrived at an easy diagnosis of certain uneasy symptoms."

In 1901 Bret Harte developed cancer of the throat. After a serious operation in March, he wrote to Pemberton:

"Tell your medical student son that the operation and the instruments were so fascinating that they delighted even the victim."

In May, hemorrhage set in, and shortly afterwards he was eased for all time of the symptoms of "nostalgia," that dread affliction which Yuba Bill, the philosopher stage-coachman, whimsically defined as "a kind of longing to go to Heaven."

[From Schenckius: Observationum Medicarum, Francofurti, 1609.]

EDITORIAL

THE SESQUICENTENNIAL OF THE NEW HAVEN COUNTY MEDICAL SOCIETY

IN January, 1934, the New Haven County Medical Association celebrated the 150th anniversary of its founding. In addition to a number of interesting addresses there was a valuable exhibit of early medical manuscripts, books, etc., and portraits of physicians and historical prints.

This was the first medical organization in the United States to publish a volume of transactions, and this volume has been reproduced in facsimile in the *Yale Journal of Biology and Medicine*,[1] in an issue which also contains the historical addresses delivered on the occasion, the issue constituting a valuable contribution to American medical history.

"The Medical Society of New Haven County in the State of Connecticut," was instituted in 1784, and four years later, in 1788, it issued its first volume of Transactions, entitled "Cases and Observations; by the Medical Society of New Haven County." The volume, its contents, and those who contributed to it are fully described by Dr. George Blumer. As he says: "Considering the pamphlet in the light of the medical knowledge of the day we must regard it as a worthy and substantial contribution which reflects great credit on the practitioners of New Haven County." The most valuable contribution is that of Dr. Hezekiah Beardsley, "Case of scirrhous in the pylorus of an infant," in which he describes a case of hypertrophic stenosis of the pylorus in an infant. This report attracted the attention of the late Sir William Osler who was so struck with its clearness and accuracy that he republished it in the *Archives of Pediatrics* in 1903. The other "Cases and Observations" present nothing especially noteworthy, except the report by Dr. John Spalding of a case in which the breech-pin of a musket which had exploded passed through the orbit and lodged between the spinal column and the angle of the jaw. It was not detected until six months later when an abscess formed about it. The pin could not be dislodged until Dr. Spalding trephined the lower jaw and sawed through the foreign body, by which means he managed after several sittings to finally get it out. The patient made a perfect recovery, although of course he had lost the eye in the orbit through which the breech-pin had passed. It might be added that all the papers present evidence of care in their preparation and constitute a witness to the scholarship as well as medical ability of the men who wrote them.

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[1] Vol. 6: No. 3 (Jan.) 1934.

BOOK REVIEWS

HISTORY OF CHINESE MEDICINE. Being a Chronicle of Medical Happenings in China from Ancient Times to the Present Period. By K. Chimin Wong and Wu Lien-Teh. Tientsin, China, Tientsin Press, Ltd., 1933.

This is truly a remarkable and most valuable book, the result of fifteen years' hard work, under the greatest difficulties, by two of China's most distinguished and able medical men. It is really a source book, carefully compiled, well annotated, and excellently put together. We know of no other book which comes anywhere near being a history of Chinese Medicine and it is unusual to find a pioneer work of such a kind so free from flaws and so pleasant to read. Its contents will be a revelation to readers and we trust they will be many.

As with all other peoples the primitive medicine of China was demonology, plant lore and faith healing. The Chinese had a character similar to Aesculapius, Shen Nung, who is supposed to have reigned about 3000 years B.C. There are many myths and legends of his medical ability. He is the patron god of native drug guilds. He was succeeded by Huang Ti, the Yellow Emperor, who is said by some to have written the "Nei Ching," or Canon of Medicine on which Chinese Medicine is based to the present day, but it is now proved that he did not write it.

The Authors give some of the legends which have swelled the fame of Huang Ti: "He invented the nine needles for acupuncture and wrote a treatise of eighteen volumes on medicine and surgery. Finally he secured the recipe for making the Nine tripod pills. He set up a stove to prepare this medicine. Thousands of tigers and leopards came to take care of the fire for him. When the pills were finished a yellow dragon descended from heaven to conduct him to paradise. About seventy of his most faithful ministers and concubines followed in the train, the lesser officials being left behind."

Until the middle of the twelfth century B.C. medicine was entirely in the hands of priests and sorcerers, and Drs. Wong and Lien-Teh give many interesting examples of the wonders they were said to have wrought, which bear a remarkable similitude to those performed by magicians, shamans and others in the western world.

Reliable Chinese history begins according to the Authors about 722 B.C., during the Chou dynasty. Two of the names of the great men who flourished in that epoch, Confucius and Mencius, are well known to Westerners. During the eighth century B.C. Chinese art, literature and philosophy reached a high development. Unfortunately medicine was developed as a philosophic system or number of systems, entirely theoretical in character, and not based on any kind of observation or experiment. The book gives a very full and interesting account of some of these theories, the most important being the so-called Doctrine of the Two Principles, Yin and Yang. Everything under the sun originated or was developed from one or the other. They stood for the male and female, heaven and earth, sun and moon, heat and cold, etc. So there were Yin diseases and Yang diseases, corresponding to Yang organs or Yin organs, and treated by Yang or Yin drugs or remedies. These distinctions were purely arbitrary and not based on any kind of investigation or observation. There was also a doctrine of the five elements. The Chinese elements were metal, wood, water, fire and earth. As with the Greek humoral theory the body was made up of a mixture of these elements. When they were in proper proportion the body was in health, if the balance was disturbed disease followed. There is a very interesting table giving the organs and their relationships to the elements, the stars, and very nearly every other imaginable thing, such as taste, color, emotions, numbers, etc. The Chinese had a doctrine of numbers which resembles in many points that of Pythagoras. Sometime later, about the end of the Chou dynasty, the great Chinese medical classic "Nei Ching" was written, still the recognized authority in Chinese medicine after the lapse of 3000 years, and comparable in its influence in China to the Canon of Avicenna in Islamic and medieval western medicine. As the Authors point out its description of the circulation of the blood in a way anticipates Harvey's great work, in that it taught that the blood flowed continuously in a circle and never stopped. Under the Chou dynasty, in the eighth century B.C. Chinese medicine attained a high degree of development. The profession was divided into physicians, surgeons, dietitians, and veterinarians. Much attention was paid to hygiene, food, dress, and habits of living. The three typical methods of treatment were acupuncture, moxa and massage. In the second century B.C. there flourished three truly great physicians whose writings are still held in high esteem. These were, Ts'ang Kung, whose insistence on clinical observation and the case histories he published remind one strongly of Hippocrates, especially as he records a number which terminated fatally; Chang Chung-Ching, who wrote a remarkable book on fevers, and Hua T'o, a famous surgeon. He is said to have used some anesthetic mixture which enabled him to perform even major operations without pain. He performed "laparotomy, excision of the spleen, intestines and liver." He was personal physician to the King of Wei, but he so angered his royal master by his insubordinate behavior that he was executed.

As the Authors sadly remark, Chinese surgery could not progress because of the Confucian dogma which holds the body sacred and not to be mutilated in anyway, which renders the work of Hua T'O all the more remarkable.

Chapter x is one of the most interesting in the book as it deals with one of the chief features of Chinese medicine, the "doctrine of the pulse." The importance of the pulse in diagnosis was overemphasized to an amazing extent and the theories built upon its various characteristics exceed comprehension. The Authors' account of it should be read in order that this may be recognized. There are three great religious systems in China: Confucianism, Taoism and Buddhism. Taoism was founded about the sixth century B.C. and was a mixture of magic and mysticism which greatly hampered medical progress. Buddhism, introduced from India in the first century of the Christian era, distracted attention from the material studies which helped scientific medicine by its emphasis on what we would now call psychotherapy, faith healing, autosuggestion and hypnotism, all of which more or less follow leads originally suggested by the Buddhists. But in spite of these influences Chinese pharmacy and the use of acupuncture and the moxa held their own. In many fascinating pages the Authors describe the practice of medicine in China by the Chinese which has continued even since Western medicine has replaced it in the hands of the cultured, well-trained Chinese physician of today.

Book Two, 1801 to 1932, deals with the introduction and establishment of Western medicine in China. As early as the sixteenth century Roman Catholic missionaries in China seem to have established posts where some medical aid was extended to the poor. In 1692 the Emperor was cured of a tertian ague by some Jesuit fathers who gave him some "medicinal lozenges which Louis the XIV had ordered to be distributed to all the Poor in his Kingdom." Louis had had good reason to be thankful for the discovery of cinchona bark, and it was appropriate that the Jesuits who had introduced it to Europe should also introduce it into Asia. From the beginning of the nineteenth century to the present day Western medicine has been steadily penetrating China and exercising an ever-increasing influence. Space does not permit us to go into the wonderful story of how the Chinese have adopted the latest advances in scientific medicine and aided in their further development nor to deal with the magnificent hospitals and medical schools which are now disseminated in the leading cities of that vast country.

The kindness and charity with which the two scientists who have compiled this history deal with the old Chinese medical traditions is a very beautiful feature of their work. Many illustrations add greatly to the text. There are excellent bibliographies on each topic and a very complete index of the entire work.

Behind the Doctor. By Logan Clendening, M.D. With Illustrations from Contemporary Sources, Portraits, Photographs, and Original Drawings by James E. Bodrero and Ruth Harris Bohan. N. Y., Alfred A. Knopf, 1933.

This large, handsomely got up, volume is a successful effort to present the main features of medical history in picturesque form for the lay reader. In the Introduction the Author states that he wishes to signify what lies behind and forms the basis or groundwork of present-day scientific medicine, consequently he stresses the epochal discoveries in anatomy, physiology and chemistry, the advances made in diagnosis and treatment, and concludes with brief but lucid expositions of the achievements of modern scientific medicine which have been rendered possible by the labors of successive generations of research workers from Galen and Aristotle to Pasteur and Lister, and their successors. Much of the text is written colloquially in the manner which is used to popularize history and biography at the present day. The Author makes no pretense that his work is one of reference or a complete history of medicine. Many of its chapters, however, are very complete and delightfully written descriptions of the events they describe. There are a few annoying slips in the text. Thus Van Swieten's name is uniformly misspelt Van Sweiten, and the immortal Ben Allen is referred to as Ben Andrews. The illustrations are copious, excellent in quality and in many instances refreshingly original. There is an excellent index.

Mystery, Magic and Medicine. The Rise of Medicine from Superstition to Science. By Howard W. Haggard, M.D. Garden City, N. Y., Doubleday, Doran and Co., Inc., 1933.

Sir William Osler termed his delightful lectures on "The Evolution of Medicine" an "aëroplane flight through the centuries," and this term may with equal suitability be applied to this charming little work by the Author of "Devils, Drugs and Doctors." Dr. Haggard has a happy faculty in the choice of attractive as well as appropriate titles for his books, and the present is no exception to the rule. He has also a happy faculty of seizing the essential points of interest or importance in his various subjects and presenting them concisely but impressively to his readers. In the present book he does not go into the details of the medical practices prevalent among primitive people but lets the readers see at a glance the chief elements in them. He also shows that though folk medicine employed many substances, which have since been proved of medicinal value, they were used with complete ignorance of their real properties and with no attempt to ascertain them. Thus cod liver oil and the skins of toads are both useful, as scientifically demonstrated today, but when used centuries ago no one really knew why they were of service. In a few pages he shows how the impress of astrology and the doctrines of colors and numbers were deep enough to linger even today, though we no longer attach any importance to them. His account of Greek medicine is picturesquely headed "Scientific Medicine is Born—and Dies."

Arabic and medieval medicine are dealt with in a few colorful pages and the Author then describes the work of the three great medical leaders of the Renaissance: Paracelsus, Vesalius and Paré. Thenceforth we leave mystery and magic and enter the great period of Harvey and the scientists of the seventeenth century.

Dr. Haggard continues his story down to the present. The book is written with charm and vigor, and though it is a small volume and its contents are necessarily condensed each subject is adequately considered. There are many excellent illustrations and a glossary of proper names and medical terms. There is no index but it is hardly missed in a consecutive narrative of this sort which is not intended as a work of reference. We can heartily commend this delightful summary of the chief events in medical history.

THE STORY OF CHILDBIRTH. By Palmer Findley, M.D. With many illustrations. Garden City, N. Y., Doubleday, Doran and Co., 1933.

This book is a history of obstetrics written for the layman as well as the physician and as such will have a wide appeal to social workers and those interested in many varieties of welfare work. Beginning with the customs of the most primitive races it continues the story down to the present day. It might be termed a pictorial history because of the numerous illustrations which depict every phase of the art of obstetrics among the various races of mankind, those showing the practices of the American Indians and the races of the Pacific Islands, the Malay Archipelago and the uncivilized races are, of course, drawn from the descriptions of travellers and explorers. The illustrations of the Egyptian, Chinese, Japanese and other races which had attained a high degree of civilization are derived from pictorial representations made on stone or earthenware. The choice of material has been judiciously made throughout and the result is a fine series of tableaux of great value. The Author who writes for both professional and lay readers sets himself a difficult task, which Dr. Findley has met with courage and success. His book is not one for scientific reference. He does not give the data from which many of his statements are derived but this not only does not mar the story which he tells but adds to the facility with which it can be followed. It is a little surprising to find Wooster Beach and some of his followers of the "Reformed or Eclectic School of Medicine" quoted in such a way as to give the impression that they were in good professional standing and we think he is a little too harsh towards the barber surgeons, when he says that "They were the dregs of society and plied their trade to the detriment of all concerned. Of all the charlatans that have trespassed upon the domain of medical practice, they were the most despicable, the most incompetent and the most untrustworthy." This is pretty hard judgment on a class who at one time furnished almost the only operating surgeons in Europe.

It is hoped that Dr. Findley's terrible revelations of the backwardness of the United States in regard to the regulation of obstetric practice by legislation may bear fruit. It is shocking to think that this country has the highest maternal mortality in the world and that only five states exercise any real control over the practices of the midwives. In contrast he shows what is being done by a few of the states to overcome this evil.

We hope this delightful and valuable book will be widely read by all the numerous persons whose daily lives bring them into contact with the problems dealt with in its pages. It is not only a history of obstetrics but a valuable contribution to sociology.

Amerika und die Medizin. By Dr. Med. Henry E. Sigerist. With 30 illus. and 2 plates. Leipzig, George Thieme, 1933.

This is in many respects a remarkable book. Not only is it an excellent account of the development of medicine in this country illustrated by the biographies of the great men of American medicine, but it is also a penetrating history of America such as only a master historian can write. In the brief compass of 92 pages, Sigerist has written in condensed form the "Epic of America." His knowledge of continental civilizations enables him to draw apt comparisons that serve to enliven the closely-knit text. In the chapter entitled "Pioneers" Sigerist gives graphic sketches of John Morgan, Benjamin Rush, Ephraim McDowell, Daniel Drake, William Beaumont, S. D. Gross, Oliver Wendell Holmes, S. Weir Mitchell, John S. Billings, William Osler. This chapter is followed by a clear exposition of medical education, past and present, in the United States, the distribution of physicians, the rise of specialism, the hospital system, preventive medicine and the cultivation of medical research. The preparation of the book occupied the author's time over a period of four years. At its completion he had emigrated to America to take up the Professorship of the History of Medicine at Johns Hopkins University. His coming to this country will mean much for the development of a love of the history of medicine and of science in general. In a postscript to the book Sigerist promises a similar history of Russian medicine, for, as he says, Russia and the United States are the two great nations engaged in far-reaching experiments in medical care.

The present volume is quite properly dedicated to Colonel Fielding H. Garrison, the pioneer of medical history in America.

There is no American work of similar compass that gives such a clear and delightful survey of American medicine for in this type of philosophic history the author has no equal. The book should be speedily translated into English so that our own people may study their political and medical history in a work which though by a foreigner is nevertheless authoritative and has the advantage of being detached and impartial.

David Riesman.

Entwicklung der Augenheilkunde im 18. und 19. Jahrhundert mit besonderer Berücksichtigung der Schweiz (Nachlass von Prof. Horner, Zürich). By Dr. Alfred Bader. With 34 illus., 10 facsimiles and 3 tables. Basel, Benno Schwabe & Co., 1933.

The name of Johann Friedrich Horner, of Zürich, stands in the front ranks in the struggle carried on in Switzerland, in the fifties and sixties of the last century, for the emancipation of Ophthalmology from the domination of those general practitioners, who, without fitting themselves by an intense study of the eye, maintained that they had the right to deal with ophthalmological questions. The work before us tells of that effort and serves as a memorial of the centenary of Horner's birth, which occurred March 27, 1831.

After receiving his degree, in 1854, Horner proceeded to Vienna, and to Berlin, where, for a time, he was an assistant to Albrecht von Graefe; and then to Paris, in the Clinic of Desmarres. On his return to Zürich he entered into practice where he did whatever came to hand. In 1862, he was appointed to the chair of Ophthalmology in the University which position he held, until his death, from apoplexy, December 20, 1886.

Horner was a great and untiring clinician, his strength lying in his insight as a diagnostician and skill as an operator. He was a lucid and forceful teacher, also, drawing to himself hosts of students from all over Europe and America. Until his death he labored unceasingly to establish his chosen science into the position which Swiss Ophthalmology occupies today. By his character and personal charm he attracted all men to him, and, by his ability as an ophthalmologist, received recognition from a wide circle of scientific workers throughout Europe with whom he was in correspondence on the most intimate and friendly terms.

Horner was a pure clinician, having but little interest in laboratory routine and too exhausted at the end of his day's practice to compose himself for extensive literary labor. He, however, did contribute a score or more papers among which were those describing herpetic disease of the cornea; and, in 1869, the so-called Horner's triad-myosis, ptosis and exophthalmus, the syndrome expressing cervical sympathetic nerve lesion.

The special feature in the book before us is a collection of 160 letters addressed to Horner in Zürich, from many great figures in the ophthalmic world, amongst whom may be named von Graefe, von Arlt, Billroth, Krönlein, Duke Carl Theodor of Bavaria, Donders, Snellen, Dufour, von Hipple and Helmholtz.

It is to be regretted that none of Horner's letters to these friends has been found, apparently all have been lost. In the letters one sees the thrill of enthusiasm which animated the spirit of the great observers, discoverers and teachers of the middle of the last century, when modern ophthalmology was born. In the minds of those of us who today have regard for the progress which the science has made, the subjects discussed in them are of the most vital interest. Many sidelights, not the least being the unfolding of the personalities of the writers, shine out in these letters, some of which are quite lengthy, while others are only brief notes. They cover the period from 1855 to 1886. Through them we are reminded of von Graefe's venturesome surgical procedures; the revelations of the ophthalmoscopic studies of the fundus; Donders' promulgations in the fields of the anomalies of accommodation and refraction; and of Lister's and Pasteur's teachings relating to antisepsis and asepsis. All of the letters are most intimate and friendly and one learns from them that Horner must have been a lovable man, kindly, yet determined; a good correspondent. How much more valuable the work would have been had it been possible to have presented a full correspondence.

The letters are introduced and preceded by an essay of 80 pages on the development of ophthalmology during the eighteenth and nineteenth centuries, by Dr. Alfred Bader, of Basel, who presents an interesting and worthy account of the history of ophthalmology in Switzerland. There are many portrait illustrations, ten facsimiles of letters, and three tables. It is a beautifully made book of 231 pages, including a copious index.

Burton Chance.

ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

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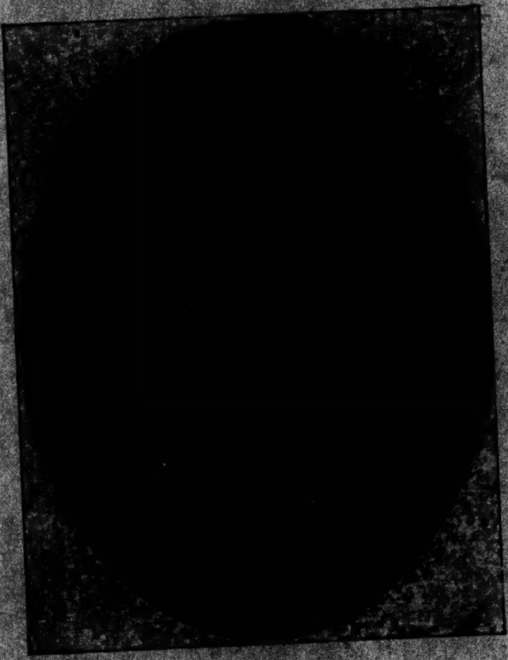

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